

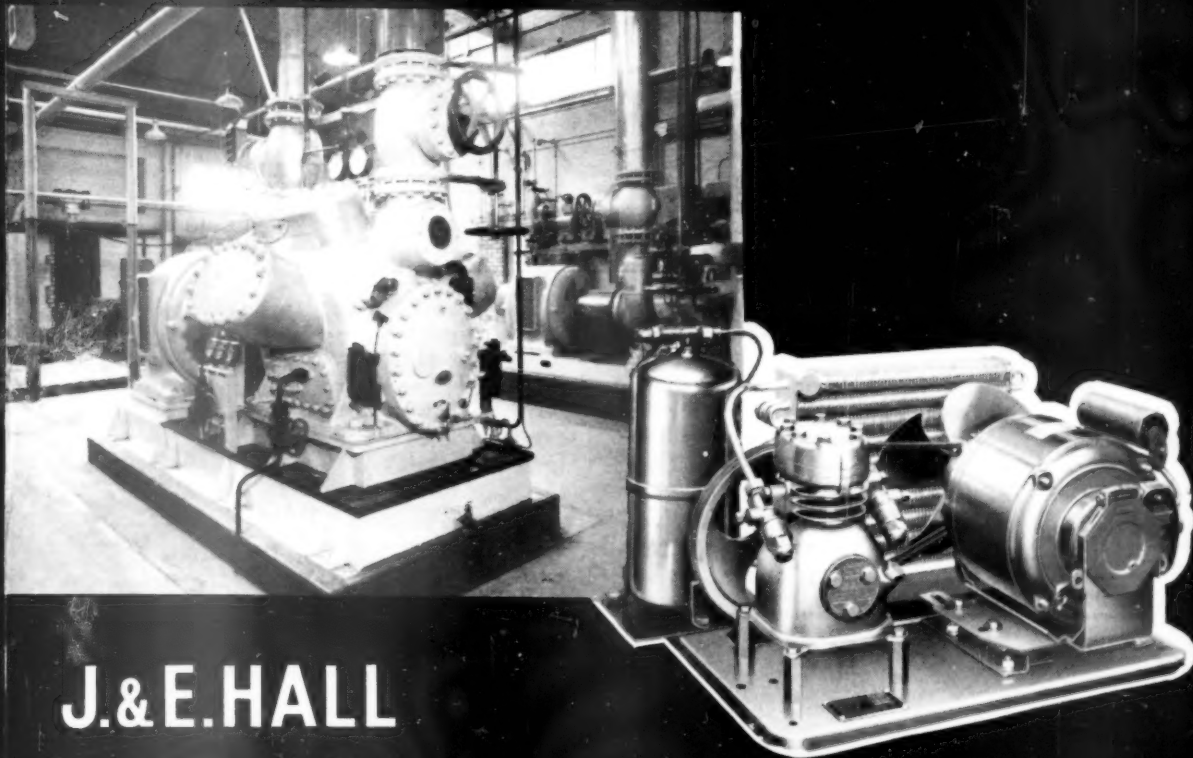
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Vol. 62 No. 730

JANUARY, 1959

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Refrigeration Equipment



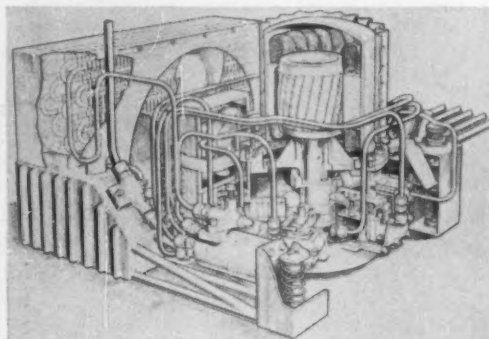
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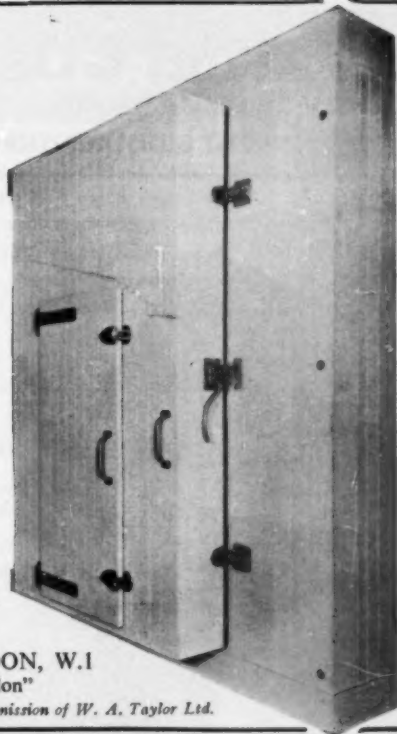
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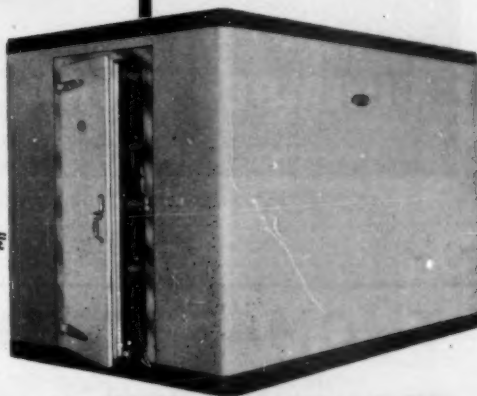
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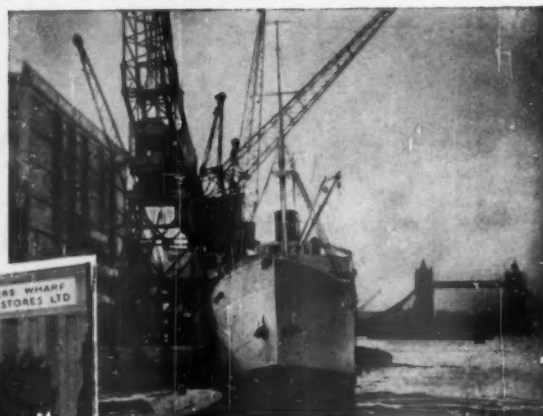
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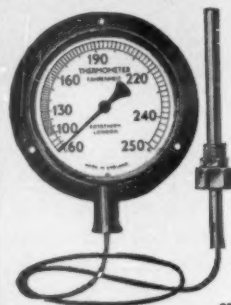
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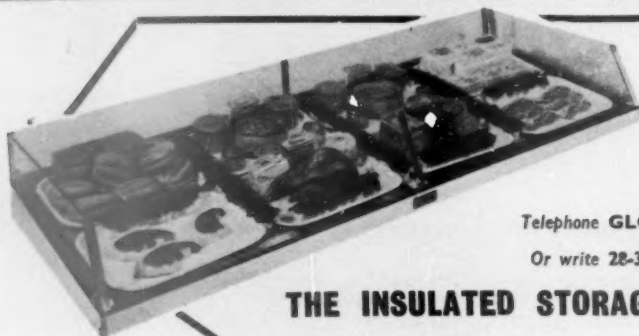
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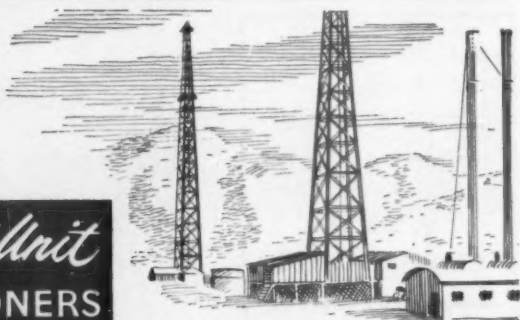
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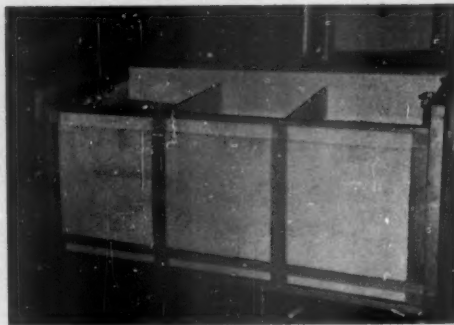
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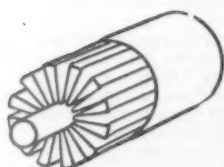
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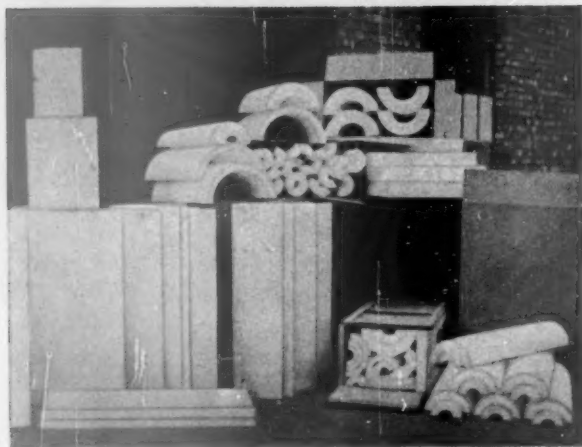


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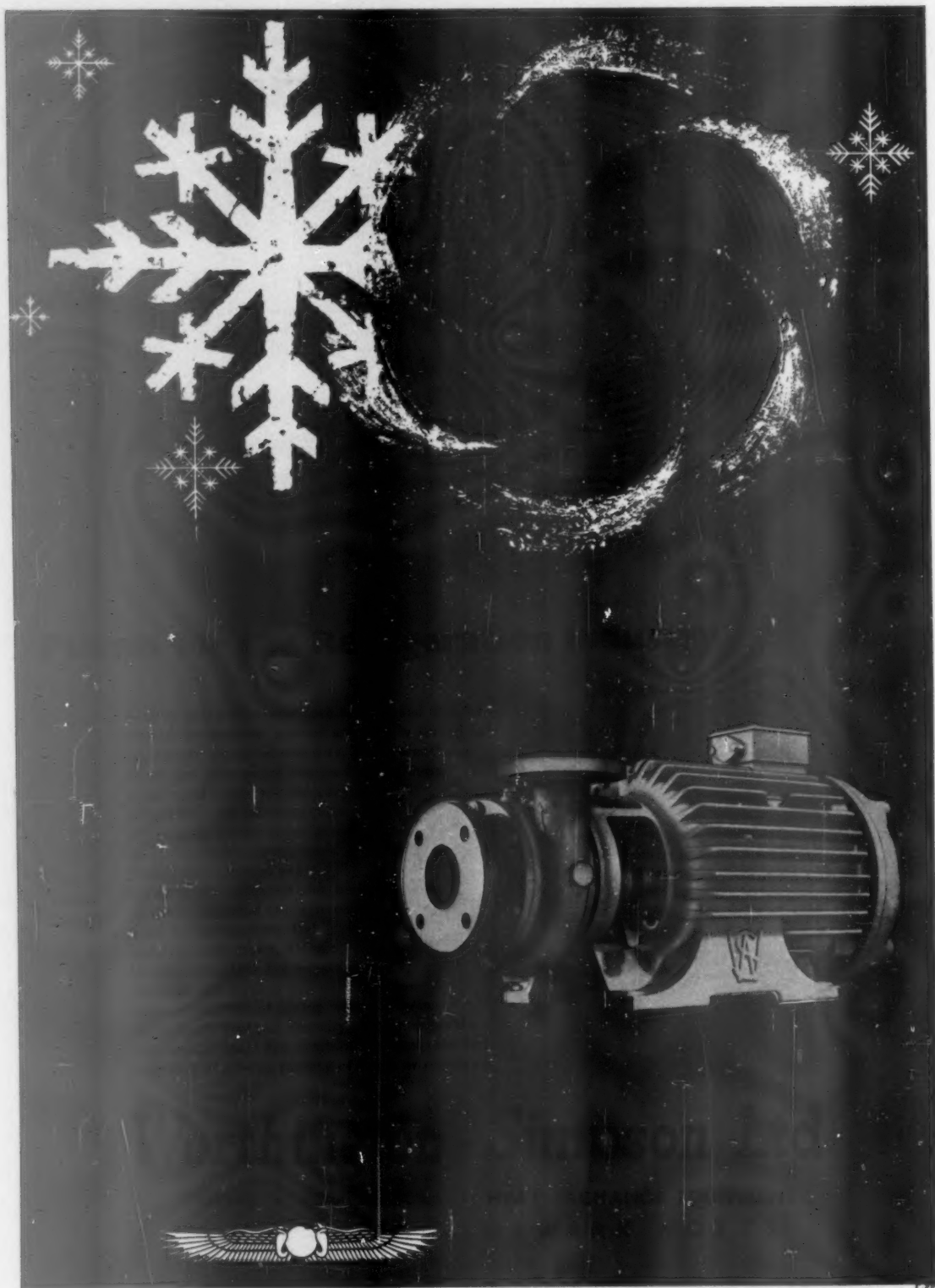
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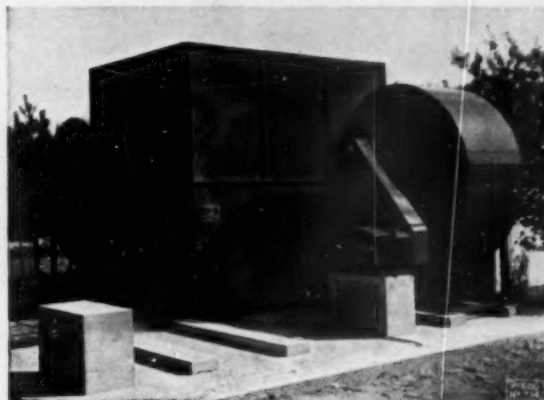
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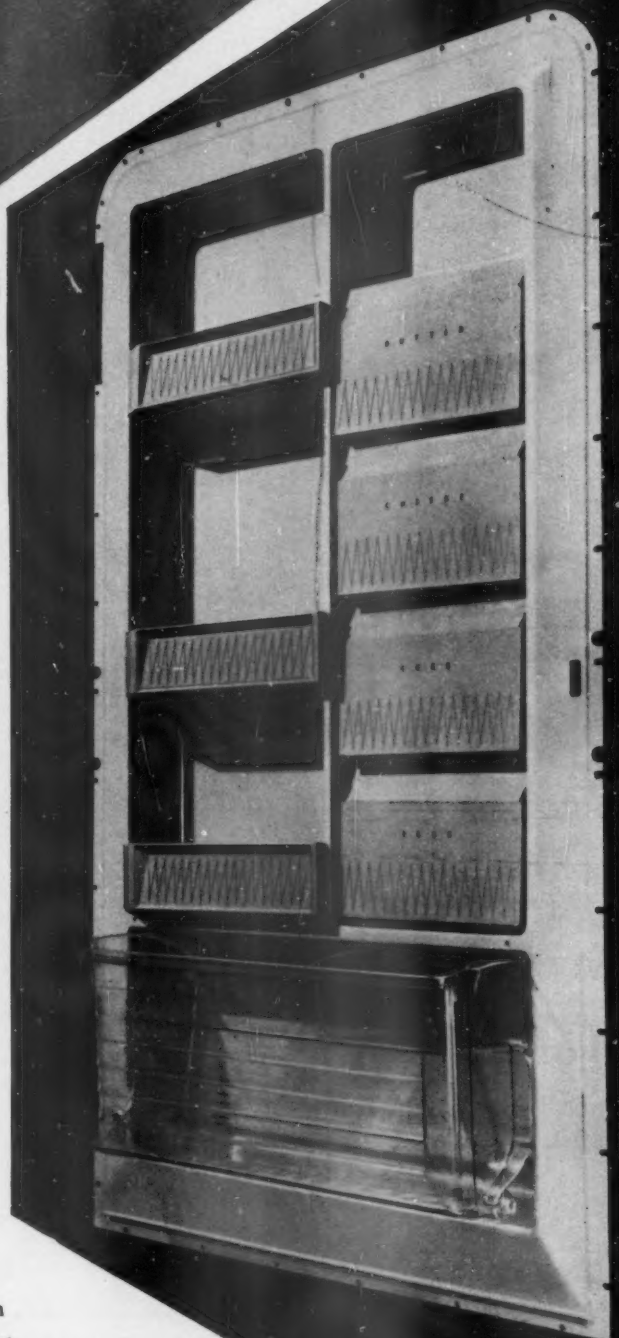
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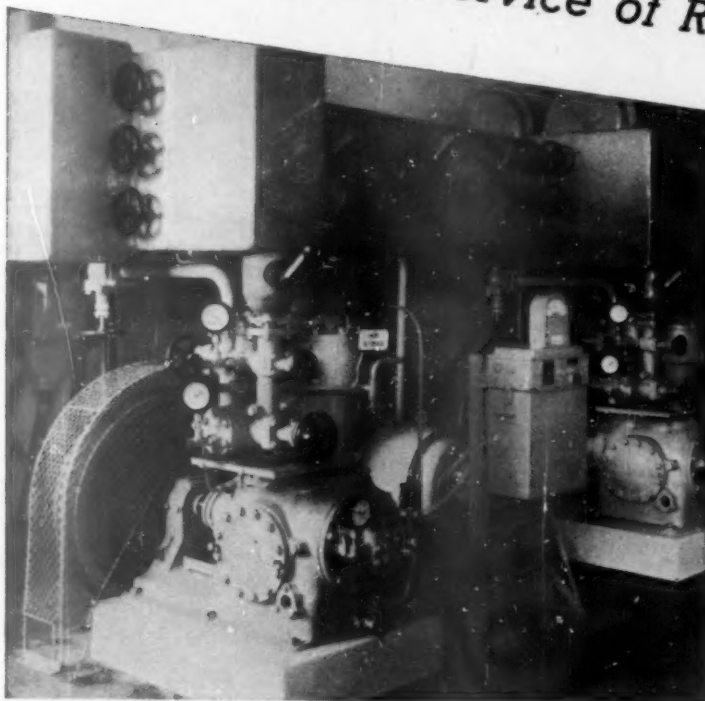
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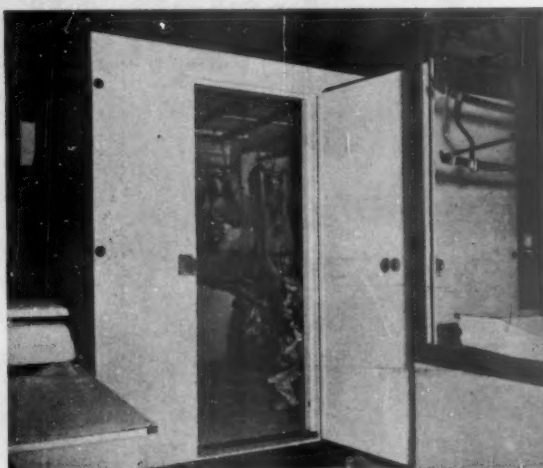
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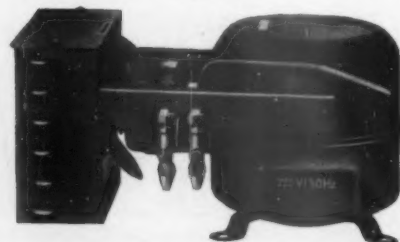



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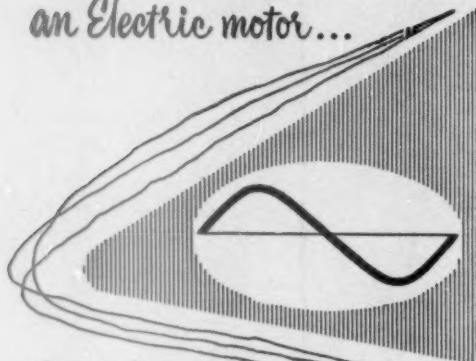
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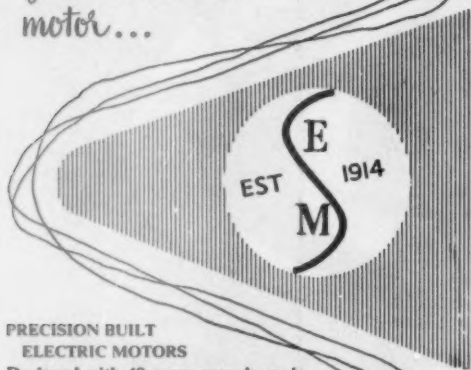
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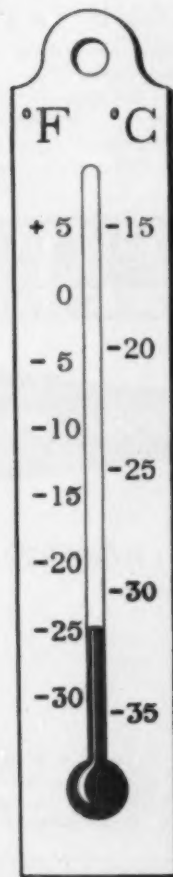


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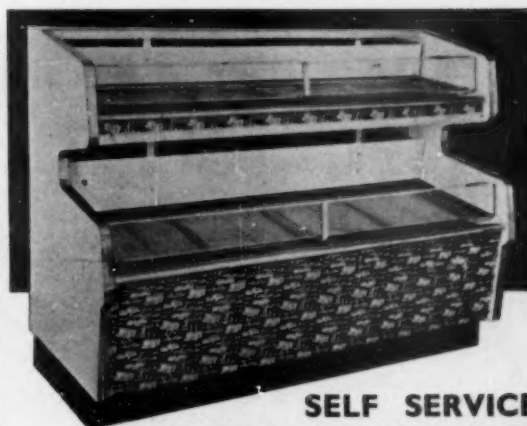
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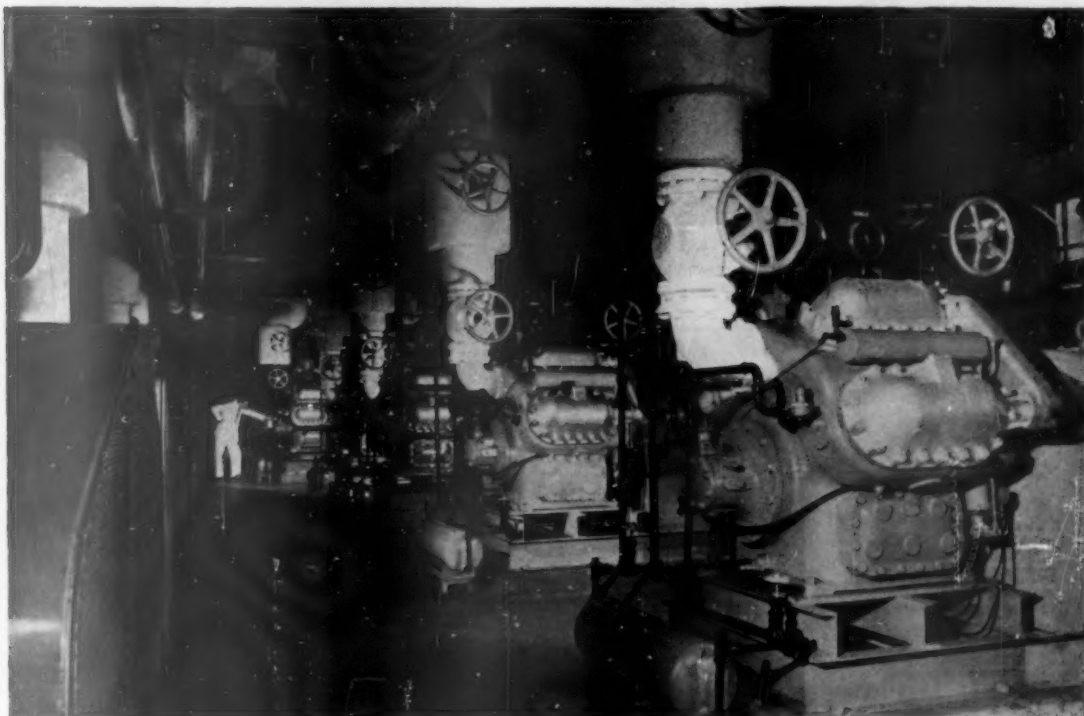
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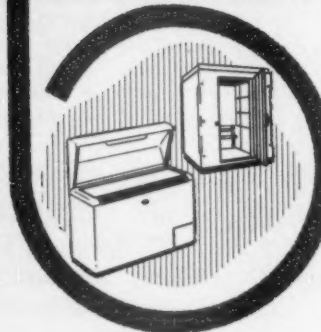
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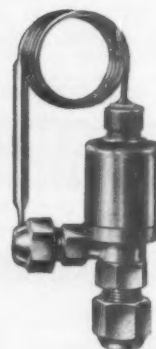
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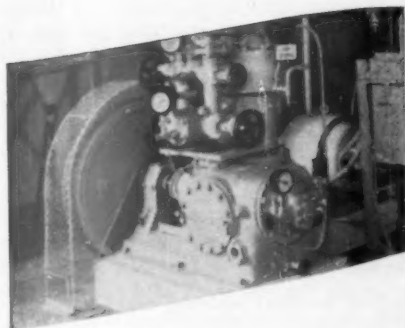
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MODERN REFRIGERATION

and Air Control News



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REVIEW
and ICE AND COLD STORAGE
Established 1898



Editor-in-Chief:
THEODORE A. RAYMOND

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The world-wide circulation of this, the original and oldest journal of the British Refrigeration Industry, carries "MODERN REFRIGERATION" by postal subscription into the following countries:—

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"M.R.", now in its 62nd year of publication, has built up for its overseas readers special subscription and sales agencies in all the above territories.

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VOLUME 62

NUMBER 730

January, 1959

Editorial

Greetings

Thermoelectric Cooling

"Freon" as Cleanser

Congress News

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● Our friends the fluorinated hydrocarbons have now a new role to play. The cost of cleaning large electric motors may be reduced as much as 75 per cent. through on-site use of non-flammable, non-explosive, and virtually non-toxic "Freon" solvents, according to tests conducted by the Du Pont Company. Apart from the cost and safety advantages, the company states, the "Freon" solvents are of particular value in such applications because, unlike other commonly used non-flammable solvent cleaners, they will not attack insulating materials and varnishes used on motor windings. The fact that they permit in-place cleaning, rather than requiring dismantling of the motor for repair shop cleaning, not only reduces the time equipment is out of use, but makes more practical a continuing programme of preventive maintenance. As an example of the potential savings, an enclosed 600-h.p. motor, used to drive a centrifugal refrigeration compressor at one of Du Pont's plants in the United States, was cleaned in one day, without complete dismantling, at a solvent cost of about \$80. Cleaning the same motor previously required complete dismantling for shipment to an off-plant service site for one week at a cleaning cost of nearly \$400.

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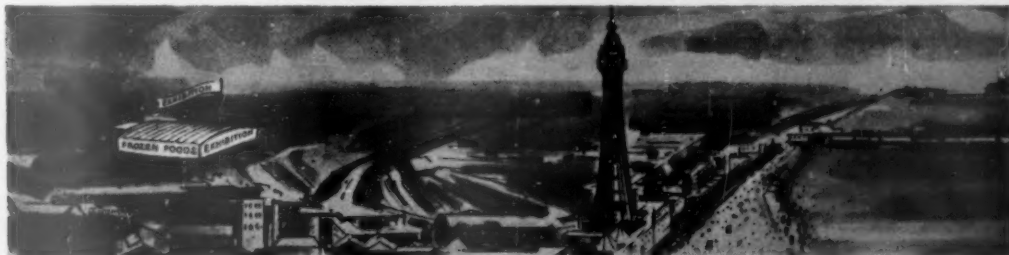
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NEWS OF THE MONTH

Refrigeration and A-c. Exports.—During November, 1958, air-conditioning and refrigerating machinery (commercial and industrial sizes) to the value of £738,737 weighing 1,086 tons, was exported from the United Kingdom. Comparable figures for November, 1957 were 1,229 tons, worth £872,261.

Exports' Analysis.—Of the 1,086 tons of air-conditioning and refrigerating plant worth £738,737 exported by Great Britain in November, 1958—quoted in the preceding paragraph—61 tons went to the Union of South Africa, 92 tons to India, 52 tons to Australia, 89 tons to New Zealand, 44 tons to Canada, 298 tons to "other Commonwealth countries," 15 tons to Eire, 12 tons to Sweden, 149 tons to Western Germany, 20 tons to the Netherlands, 14 tons to Belgium, 66 tons to France, 9 tons to Italy, and 165 tons to "other foreign countries".

Refrigeration Plant Classified.—Of the total exports of air-conditioning and refrigerating machinery during November, 1958, quoted in the first paragraph, commercial refrigerators accounted for 251 tons, worth £142,164, industrial plant and equipment for 216 tons, worth £147,409 and parts for all non-automatic refrigerating machinery, for 293 tons, worth £226,123.

Exports of Small Refrigerators.—During November, 1958, 1,350 tons of complete refrigerators (including complete mechanical units) of a storage capacity not exceeding 12 c.ft. were sent overseas from Great Britain. These exports were worth £871,012. The 1,350 tons comprised 110 tons to the Union of South Africa, 50 tons to Rhodesia and Nyasaland, 16 tons to India, 181 tons to New Zealand, 630 tons to "other Commonwealth countries," 5 tons to Sweden, 2 tons to Western Germany, 1 ton to the Netherlands, 15 tons to Belgium, 5 tons to Italy, and 335 tons to "other foreign countries".

New Store for Kingston-on-Hull.—To keep pace with the growing demand for frozen fish Kingston Deep Sea Ltd. have planned the construction of a new deep-frozen fish store at Havelock Road, Kingston-on-Hull with a capacity of 130,000 c.ft. capable of operating at -20° F. The architects are Messrs. Gelder and Kitchen, 120 Alfred Gelder Street, Hull, and the main contractors are Smiths Insulations Ltd., Burton-on-Trent. The store is scheduled to be opened during the second week in March, 1959.

Low Temperature Group.—The thirteenth annual meeting of the Low Temperature Group of The

Physical Society will be held at the Royal School of Mines, Prince Consort Road, South Kensington, London, S.W.7, on Thursday, January 15. During the year a proposal has been before the committee that some form of memorial should be instituted in memory of the late Sir Francis Simon, F.R.S., and consideration is being given to the most appropriate form for this to take.

A.S.H.A.E.-A.S.R.E. Merger.—Members of the two societies have voted for the merger of the American Society of Heating and Air-Conditioning Engineers and the American Society of Refrigerating Engineers. This was announced by A.S.H.A.E. President E. R. Queer, University Park, Pa. and A.S.R.E. President Cecil Boling, W. Hartford, Conn. in a joint statement following completion of balloting last month at a special meeting of A.S.H.A.E. in Chicago, Ill. and at the A.S.R.E. semi-annual meeting in New Orleans, La. The consolidated society will be named the American Society of Heating, Refrigerating and Air-Conditioning Engineers (A.S.H.R.A.E.). Each society recorded a high total number of ballots with 93 per cent. of A.S.H.A.E. and 73 per cent. of A.S.R.E. voting for the merger. The A.S.H.A.E. ballots totalled 5,712 with 5,307 favouring and 405 opposing the merger. The A.S.R.E. members voted 3,516 for and 1,293 against the merger with a total of 4,809 ballots.

"Ideal Home."—The *Daily Mail* Ideal Home Exhibition of 1959 will open at Olympia on March 3, and close at 10 p.m. on Easter Monday, March 30. It will not be open on Good Friday, March 27. The exhibition will include, in addition to all its usual features, the British Pavilion which was seen by nearly 5,000,000 people at the Brussels Fair. It is made up of the Hall of Tradition, the Hall of Science and Technology and the Courtyard of Invention.

Physical Society Exhibition.—The Physical Society Exhibition will be held at the Royal Horticultural Society's old and new halls, Westminster, London, S.W.1 (just behind Victoria Street from Artillery Row) on the following dates: Monday, January 19, 10.30 a.m. to 7 p.m. (members and Press only, 10.30 a.m. to 2 p.m.); Tuesday, January 20, 10 a.m. to 9 p.m.; Wednesday, January 21, 10 a.m. to 7 p.m.; Thursday, January 22, 10 a.m. to 4.30 p.m. As in past years, the exhibition will remain open during the lunch hour. The opening ceremony will be performed in the new hall on January 19, at 11 a.m. by Sir Cyril Hinshelwood, F.R.S. Discourses (demonstration-lectures) will be given at 5.45 p.m. as follows:—

January 19, "The physics of controlled thermonuclear fusion," by Mr. R. S. Pease (Atomic Energy Research Establishment, Harwell); January 20, "Frontiers of space," by Dr. Robert Page (U.S. Naval Research Laboratory, Washington); January 21, "Physical science in the Trans-Antarctic expedition," by Mr. J. G. D. Pratt, introduced by Sir Vivian E. Fuchs.

SALES OF NEW DOMESTIC APPLIANCES BY AREA ELECTRICITY BOARDS

The following return shows the number of new appliances sold by area electricity boards in England and Wales for the month of October and for the 12 months ended October 31, 1958, together with percentage changes over corresponding periods of the previous year.

When assessing the figures, it must be borne in

mind that the sales by area boards represent only a part of total sales throughout the country.

	Sales in month ended October 31, 1958		Sales in 12 months ended October 31, 1958	
	Total	Per cent. change over correspond- ing period of previous year	Total	Per cent. change over correspond- ing period of previous year
Cookers	30,834	+ 51.2	241,342	+ 5.6
Water heaters				
immersion	11,789	+ 35.1	160,512	+ 15.0
storage	4,979	+ 38.0	46,324	+ 11.4
Washing machines	9,143	+ 33.9	78,987	+ 7.9
Refrigerators	4,203	+ 68.1	64,138	+ 30.6



★ Picture of the Month



When the Kent branch of Prestcold suggested to the Electricity Boards in Orpington and Tonbridge that they might like to hold a Christmas Refrigerator Fair, the idea, though novel, was received with enthusiasm. It was decided that the two fairs should run simultaneously for one week in December. At each showroom a complete range of the Prestcold domestic models were on display, in very attractive Christmas settings. In addition, a number of commercial models were shown, each one having its uses indicated to both the retailer and the customer. The fairs proved to be very popular, and having them a week or so before Christmas was justified in that orders could be delivered as presents. It was noted that quite a number of husbands had the excellent idea of making their Christmas gift one for the entire family.

New Cold Store in Scotland.—Supplementing the extensive manufacturing facilities which already exist at Craigmillar, near Edinburgh, T. Wall & Sons (Ice Cream) Ltd. have planned the construction of a new cold store adjacent to the main factory to serve the purpose of a hardening and storage room. The internal dimensions of the proposed store are :—length 153 ft. 10 in. ; width 93 ft. 5 in. and height 20 ft. which will give a total cubic capacity of 400,000 c.ft. The store will operate at temperatures down to -20° F. Smiths Insulations Ltd., of Burton-on-Trent, have been appointed as main contractors and will be responsible for all building work, steelwork, the cold store and outer cladding. Their normal prefabrication technique of all structural units will be used so that quick assembly on site can be carried out, saving time and labour and eliminating delays due to bad weather. Insulation will be achieved by 12 in. cork and the Minikay dehydration system will be incorporated on the inner layer. The store will be air cooled, using Lightfoot equipment, with air ducts across the ceiling from the first floor extension of the cold room which houses them. All walls and ceiling will be finished in polar white and in line with modern practice, full palletization will be operated to ensure the quick and easy handling of the products.

* * *

New Quick-Freezers Association.—The formation is announced of a new association to represent the quick-freezing industry. It will be known as the National Association of Frozen Food Producers and has been formed by the merger of the former National Association of Quick-Frozen Food Processors and National Federation of Fish Quick Freezers. The announcement of the new association underlines the tremendous growth in the production and sale of quick-frozen food in recent years. The general secretary, Mr. W. Mitchell, will control the full administration, and as the needs of each division warrant it a secretary will be appointed to that division. This should give each division as much autonomy as possible while ensuring that matters affecting the industry as a whole are not overlooked. The first president is Mr. A. S. Alexander, who for the past three years has been president of the Processors' Association. He will be pleased to supply details to potential members and a cordial invitation to membership is extended. All correspondence should be addressed to the general secretary at Monotype House, 43 Fetter Lane, London, E.C.4.

* * *

Scottish Dairy Show.—The Scottish Dairy Show will be held from February 17 to 20, in the Kelvin Hall, Glasgow. This event is always well supported by the refrigeration industry and current anticipation is that the trade will again use the event strongly. Our Scottish correspondent also reports that a new bulk milk collection scheme is projected for East Fife. The N.F.U. and the Scottish Milk Marketing Board

have tentatively agreed that a scheme is possible, support having been given by 10 farmers, producing 650,000 gal. annually.

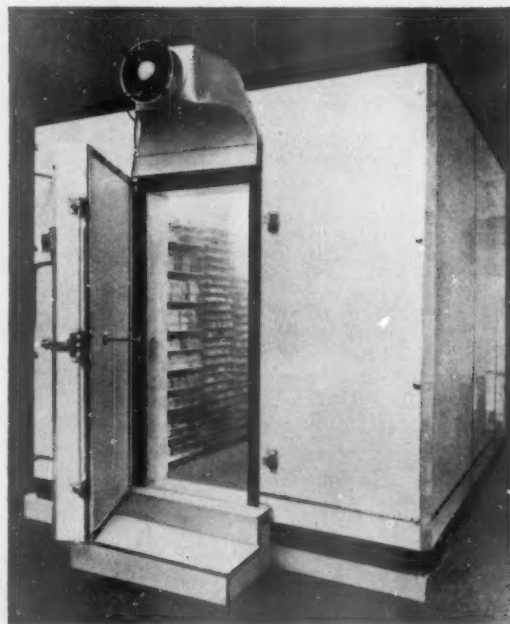
COLD STORE ELIMINATES NIGHT SHIFT

A NEW 600 c.ft. cold store has been installed in the bakery of Coopland and Son (Scarborough) Ltd. (Newborough, Scarborough) to provide a stock of perishable goods—kept at a consistent temperature of -8° F.—which can be drawn on at particularly busy times.

The use of the cold store is claimed to obviate the need for a night shift and to prevent wastage. It also has the added advantage of maintaining a constant supply of the complete range of goods.

The overall size of the store is ten feet deep, eight feet wide and eight feet high, with the exterior panelled entirely with Waverite wallboard in "Grey Piccadilly." The panels are screwed to intermediate bearers and held at the edges by stainless steel fixing sections. The interior is completely panelled with stainless steel sheet.

Extensive alterations are now being carried out at Coopland and Son (Scarborough) Ltd. and the structure is at the moment in a temporary position. It has been specially designed, however, for easy dismantling and re-erection on the permanent site when convenient.



The cold store was designed and installed by H. Coursh and Sons (Koldaire) Ltd., Atwick, near Hornsea, Yorks.



A MODERN AIR-CONDITIONED LINER

WITH NEARLY HALF A MILLION CUBIC FEET OF REFRIGERATED CARGO SPACE

TO the grace and elegance of the later vessels of the royal mail fleet of the Union-Castle Mail Steamship Co. Ltd., (*Stirling Castle*, *Athlone Castle*, *Capetown Castle*, *Pretoria Castle* and *Edinburgh Castle*) has now been added gaiety in décor by the commissioning of the *Pendennis Castle*. It is probably the gayest ship sailing the southern waters.

This beautiful ship was inspected by "M.R." last month prior to her maiden voyage to South Africa. Built by Harland and Wolff Ltd. of Belfast, she is 764 ft. overall and is of 28,582 g.r.t. (*Pendennis Castle* is named after an ancient and famous fortress in the west country of England. Built by Henry VIII in 1543, its prime function was the defence of Falmouth harbour against the attacks of the French, with whom Henry was at that time at war.)

The keel of the *Pendennis Castle* was laid on November 28, 1955. In January, 1956, Union-Castle merged with Clan Line to form The British and Commonwealth Shipping Company and the new management decided to incorporate numerous additional features into the vessel, and to give her a greater speed than had been planned. The fitting of Denny-Brown stabilisers necessitated lengthening the ship

amidships after construction had commenced on the slipway—a most unusual operation representing a remarkable feat of engineering skill.

The propelling machinery, developing over 42,000 shaft horsepower, comprises two sets of double-reduction geared steam turbines, one set driving each propeller.

The accommodation for first and tourist class passengers is on four decks (there are altogether nine decks between the double-bottom tanks and the navigating bridge).

Among the public rooms are the first-class dining saloon and the private dining room adjoining (available for luncheon, dinner and cocktail parties); the lounge, with the large screen of "Filigrana" glass; and the tourist-class Harlequin bar or smoke room, which is one of the brightest rooms in the ship and should prove very popular.

The arrangement of the first-class public rooms on the promenade deck is new to Union-Castle ships. It incorporates an open-air swimming pool and lido area. There is also a tourist class open-air swimming pool and lido. Both pools are fitted with a special device to prevent excessive movement of the water.

Although the ship will be engaged on what is

recognized as a "fair weather" route, Denny-Brown stabilizers have been fitted, so that even the "Bay" will be robbed of its terrors.

Air-conditioning has been installed in the dining saloons, first-class suites, de luxe rooms and first-class inboard cabins in *Pendennis Castle*; the hairdressing saloons and beauty parlour are also air-conditioned.

Refrigeration plant for the above air-conditioning equipment, for the cooling of the insulated cargo spaces and of the provisions chambers has been made and installed by J. & E. Hall Limited. This plant consists of three Hall's eight-cylinder veebloc "Arcton" compressors each driven by a 220 b.h.p. motor, and one six-cylinder 75 h.p. compressor, with all the necessary ancilliary equipment.

Two of these machines deal with fruit and meat cargo spaces which total 410,950 c.ft. capacity, provision rooms of 34,120 c.ft. capacity, various cold cupboards in bars, pantries, butcher's shop, bakery, ice cream room, etc., fresh water cooling and ice-making. Ten fruit cargo spaces are suitable for deciduous fruits at 31° F. or citrus fruits at 38° F. three meat cargo spaces are suitable for chilled meat at 29° F. or frozen meat or butter at 10° F. or for deciduous or citrus fruits at the temperatures previously mentioned. The six-cylinder veebloc machine deals with the five low temperature cargo chambers

and four provision low temperature rooms held at -5° F. The third main machine acts as a standby for any of these demands or to assist the other two machines when cooling down a full cargo of fruit. When not required for either of these duties this machine works on air-conditioning—to cool 33,000 g.p.h. of brine to 45° F. meeting a demand of 1,650,000 B.t.u. per hour.

The cooling of the spaces is effected by means of air circulation over brine-cooled batteries through the spaces with the exception of one fish room and the ice cream room which are cooled by brine grids fitted on the roof and sides. Brine circulation to cargo and provision rooms is hand controlled.

Seven independent Hallmark units with insulated cupboards or cabinets for beer drum and bottle cooling have been fitted in bars situated on various decks.

Two Hallmark automatic ice-makers, each capable of manufacturing over 8,000 ice cubes (375 lb) per 24 hours (272 cubes, each weighing $\frac{3}{4}$ oz., are formed in a batch time of approximately 45 minutes) have been installed in the first-class galley and tourist smoke room.

Ten Electrolux domestic-type refrigerators are installed at various points in the vessel.



Air-conditioning grilles can be seen in this view of the first-class dining saloon.
(We learn that Mr. R. Saunders, of W. A. Taylor Ltd., is a passenger on the maiden voyage)

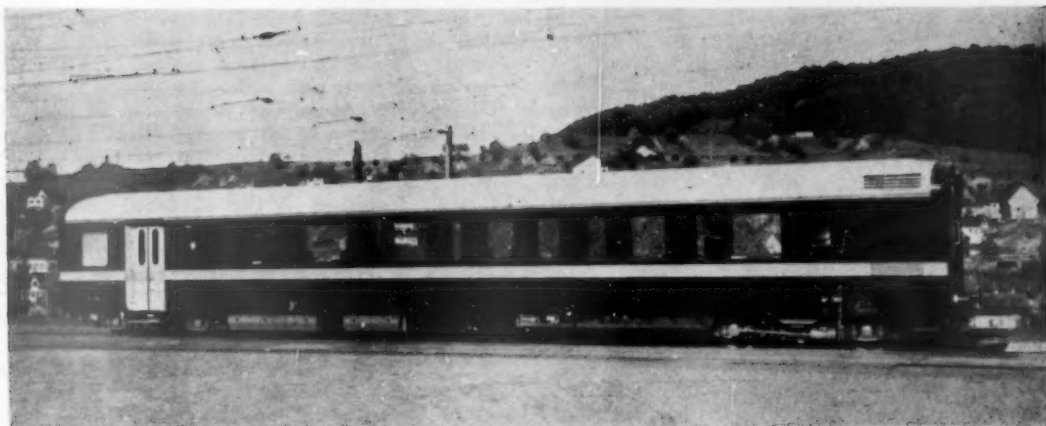


Fig. 1.—The new saloon car of the Swiss Federal Railways.

(Photograph by courtesy of SIG, Neuhausen)

Ventilation and Air-Conditioning of Rail Vehicles

By G. LIENHARD*

There is a growing tendency on the part of railway companies to equip their new passenger coaches with automatic ventilating or air-conditioning systems. After reviewing a few methods of ventilation adopted in recent Swiss rolling stock, the following article describes in some detail the air-conditioning equipment installed in a new saloon car of the Swiss Federal Railways

IMPELLED by growing competition from other forms of passenger transport as well as by general engineering trends, railway companies are now examining all possible means of increasing the speed and comfort of rail travel. In Switzerland a major move in this direction was made at an early date with the introduction of electrification. Many other railway companies are now adopting diesel traction for the same purpose.

A notable contribution to travel comfort can be made by the draught-free ventilation of passenger coaches, enabling agreeable atmospheric conditions to be maintained in the compartments even when the windows are closed. This is a particularly important consideration in smoking compartments in winter and for that matter in all rush-hour trains, in which periodic changes of air are essential.

For these reasons the Swiss Federal Railways and a number of other Swiss railway companies, such as the Berne-Lötschberg-Simplon Railway, have now begun to equip all new carriages with air heating or ventilating installations.

The new light-steel coaches of the Berne-Lötschberg-Simplon Railway, series C 4ü and B 4ü, have ventilating equipment designed by Sulzer Brothers. The fresh-air intake is located above the doors at one end of the coach. The air treatment equipment is fitted in the space between roof and ceiling. After being drawn in by a fan, the air enters this space through two filters and passes by way of an air heater into a duct running down the middle of the coach. From this duct it flows uniformly into the compartments through a perforated ceiling, while the used air escapes to the atmosphere through window slits and other interstices. The air is changed about 9 or 10 times per hour.

The fan motor is connected to a d.c. battery and operates at 36 volts.

As the installation is not intended to meet the full heating requirements, these coaches are also fitted with the usual electric resistance heaters running along the bottom of both outside walls.

The new carriages of the Swiss Federal Railways are heated entirely with warm air, and the resistance

* By courtesy of Sulzer Brothers, Winterthur.

heaters are therefore eliminated. The fresh-air intakes are in this case at both ends of the coach. The fan draws the air through the filters above the doors and forces it through the air heaters into two distributing ducts which run along the bottom of the walls. From here it is blown into the compartments through openings evenly distributed over the full length of the coach. There are 12 changes of air per hour. The installation is used for heating in winter and for supplying fresh air in summer, when a certain amount of cooling is possible, depending on the outside air temperature.

A further improvement on this system is the provision of coolers for the summer, so that even on the hottest days a pleasant temperature can be maintained in the compartments without the drawback of draughts from the windows. This brings us to air-conditioning proper, as provided for instance in the Swiss Federal Railways' new saloon car As 4ü 1001.

Air-Conditioning Installation for the New Saloon Car

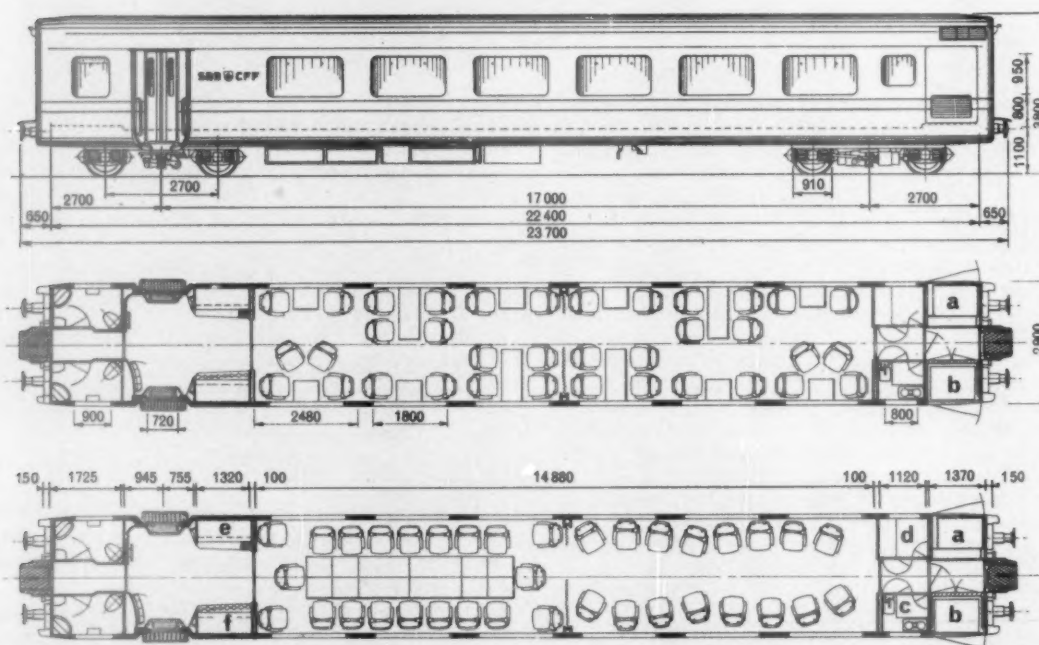
On May 16, 1956, to mark the jubilee of the completion of the Simplon Tunnel, the Swiss Federal Railways put a new saloon car into service which had been completed by the Swiss Industrial Company (SIG), Neuhausen, in the very short period of five months.

This new coach is 23.7 metres (77 ft. 9 in.) long over the buffers, weighs 34 tons and seats 36 passengers (fig. 1 and 2). Entry is at one end only, where the cloakrooms and toilets are located. The air-conditioning equipment is housed at the other end, where there is also a small kitchen and service compartment. The saloon has six windows, 6 ft. in length, on either side and is tastefully and comfortably furnished. The 12 tables and 36 arm-chairs can be loosely grouped around the windows or combined to form a conference table (fig. 3). The saloon can also be divided into two compartments by a central curtain.

The air-conditioning installation, which is used for heating in winter and cooling in summer, is designed for the following working data:—

Temperature in winter at	
-20°C . outside temperature	$+20^{\circ}\text{C}$.
Temperature in summer at	
$+30^{\circ}\text{C}$. outside temperature	$+26^{\circ}\text{C}$.
Fresh-air supply	3,000 c.m. per hour
Minimum fresh-air supply	1,000 c.m. per hour
Changes of air in saloon	27 per hour
Rating of motor driving centrifugal fresh-air fan	1 h.p.
Number of heating steps (electric air heater divided into three sets of 3 to 6 and 12 kW.)	Seven

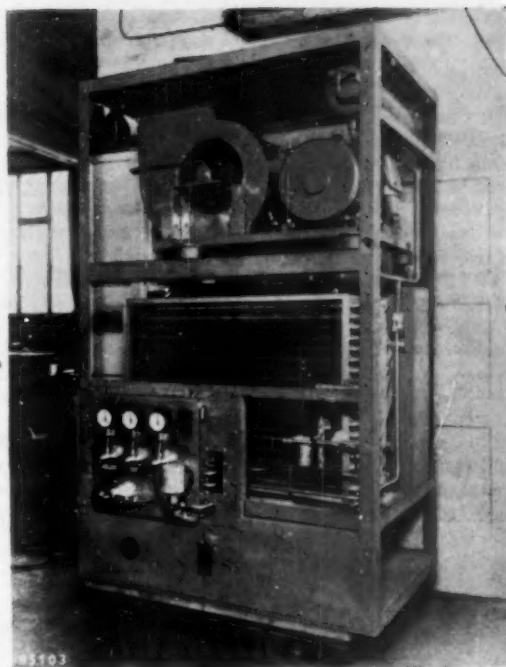
Fig. 2.—The new saloon car of the Swiss Federal Railways. Elevation and layout plans (by courtesy of SIG). a—Air conditioning unit; b—Refrigerating unit; c—Kitchen; d—Service compartment; e—Cloakrooms.



Heating capacity	21 kW.
Heating capacity of lateral and resistance heaters, divided into seven steps	12.8 kW.
Cooling capacity of refrigerating sets	13,000 kcal. per hour
at evaporating and condensing temperatures of $+5^{\circ}$ and $+48^{\circ}$ C. respectively.	
Infinitely variable capacity regulation of piston-type compressor from	100 to 30 per cent. (approx.)
Rating of compressor driving motor	6 h.p.
Air volume for cooling condenser	5,800 c.m. per hour
supplied by two centrifugal fans with a common driving motor rated at	2 h.p.
and expelled direct to atmosphere after condenser cooling.	

Total weight of air-conditioning installation (approx.) ... 2.5 tons

This installation had to be designed to fulfil numerous requirements. It had to be unaffected by the vibration and impacts to be expected in a rail vehicle; to be low in weight; to ensure a pleasant saloon temperature under all weather conditions, with adequate changes of air and draught-free introduction of the heated or cooled



air; to allow of maintenance by railway personnel without any special training; to offer easy accessibility for inspection and simple dismantling for



Above: Fig. 4. — Air-conditioning unit.

Fig. 3.—Interior of the saloon car.

overhauls; and to consist of standard units for which spare parts are always available from stock.

Air Treatment

It was decided not to provide for any additional humidification of the air, as the mean relative humidity in summer is in any case about 50 per cent., while in winter it may be a little lower, according to the outside temperature. This made it possible to save space while helping to guard against condensation on the large windows.

The minimum fresh-air quota is 28 c.m. (990 c.ft.) per person and hour, which is generally regarded as ample. In the range between $+5^{\circ}$ and $+22^{\circ}$ C. outside temperature, fresh air only is introduced, without the admixture of any recirculated air, so that the fresh-air quota per person and hour is over 80 c.m. (2,825 c.ft.).

The Sulzer air-conditioner is a compact unit of welded iron sections to which sheet-iron casing elements are screwed (fig. 4). Large inspection doors at the front offer good accessibility to the

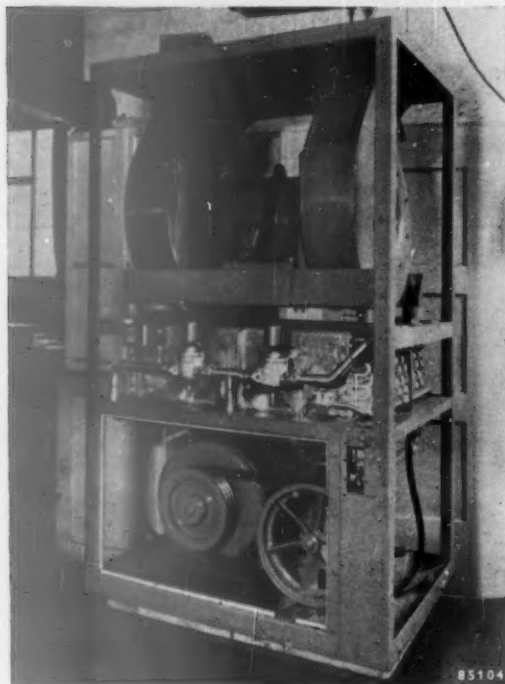


Fig. 5.—Self-contained refrigeration unit.

apparatus when the wall of the coach is swung outwards.

The centrifugal fresh-air fan with its motor and V-belt drive is fitted in the upper part of the frame and is flexibly mounted on shock absorbers.

The coarse filters for fresh and recirculated air are located in the middle of the frame along with the fine dust filter. The air cooler stands on a drip pan. Here the refrigerant, in this case "Freon," is evaporated so as to extract heat in summer from the air delivered to the interior of the coach. The lower part of the frame houses the damper for fresh and recirculated air with its servomotor and the suction throttle valve for regulating refrigeration.

Instruments registering the circulation of the refrigerant are fitted on the back of the unit, which can be installed and removed as a whole with the aid of a hoist.

The 21-kW. air heater fitted in the supply ducting is capable of heating the air from $+6^{\circ}$ to $+27^{\circ}$ C. at a minimum outside temperature of -20° C.

Refrigeration

A normal air-cooled unit with a standard compressor is employed for refrigeration. It is constructed on the same principles as the air-conditioning unit and is placed opposite the latter on the entrance platform. The upper part houses a direct-driven twin fan set mounted on shock absorbers and supplying the cooling air for the condenser. A coarse filter is fitted frontally in the lower part of the unit, the suction opening in the hinged wall of the coach being covered by a louvre. The cooling air flows over the compressor and its driving motor before passing through the condenser, which is placed horizontally and bolted to the frame. In order to keep the centre of gravity of the unit as low as possible, the compressor base is mounted on shock absorbers on the floor of the unit. The slow-running reciprocating compressor of standard design is driven by a motor through V-belts (fig. 5).

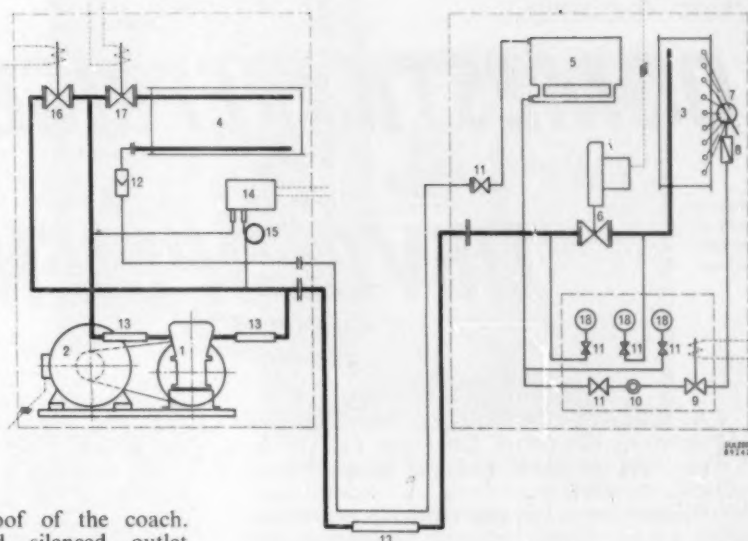
The refrigerant circuit is shown in the diagram (fig. 6). The refrigerant used is "Freon-12." To relieve the compressor when starting, by-pass valve 16 opens for a short time till the full compressor speed is reached, while valve 17 remains closed. In normal operation the "Freon" gas coming from the compressor is liquefied in the condenser and injected through a thermal expansion valve into the air cooler, where it evaporates. The automatically controlled suction throttle valve fitted in the gas pipe allows no more gas to pass than is required for refrigeration. The suction pipe conducting the gas to the compressor runs above the refrigerating unit and acts as a cooling tube, helping to lead off the radiant heat.

Air Circulation and General Arrangement

In view of the various possible arrangements of the seating accommodation and the low headroom in the compartment, a screw-on perforated ceiling was chosen for the admission of the conditioned air. Two well-insulated supply ducts run along the whole length of the compartment

Fig. 6.—Working diagram of the refrigeration unit in the saloon car.

- 1 Compressor
 - 2 Motor
 - 3 Cooling coil
 - 4 Condenser (air cooled)
 - 5 Freon receiver
 - 6 Throttle valve
 - 7 Thermal expansion valve
 - 8 Strainer
 - 9 Solenoid valve for liquid
 - 10 Sight glass
 - 11 Shut-off valves
 - 12 Non-return valve
 - 13 Vibration eliminators
 - 14 H.-p. l.-p. pressostat
 - 15 Capillary tube
 - 16 Bypass valve
 - 17 Shut-off valve
 - 18 Pressure gauges
- Electric connexions



between the ceiling and the roof of the coach. Sixteen specially designed and silenced outlet regulators lined with light synthetic foam rubber discharge the supply air into the ceiling space. In summer, when cooling is required, air at a temperature well below that in the compartment is admitted, but without causing draughts. In winter the air is heated before admission. The coach is also fitted with electric resistance heaters running along the bottom of both side walls.

Twelve air exhaust valves screwed into a central duct extract the used air for expulsion or recirculation. The exhaust air escapes either through cloakrooms and toilets or through an opening at one end of the coach, according to the excess pressure prevailing in the compartment and the amount of fresh air supplied.

Temperature Control

The electric control system with which the temperature is regulated is fully automatic and unaffected by vibrations.

The resistance heating system takes the base load in the saloon and subsidiary compartments. The heating output of the radiators is controlled by outside thermostats and is independent of the air-heating system.

An outside thermostat switches the air-conditioning installation over automatically from summer to winter service or vice versa. This automatic change-over is important when the coach passes through different weather zones at short time intervals or through long and fairly warm tunnels when low temperatures prevail outside.

Several thermostats inside the coach adjust the cooling or heating performance. When the air is being cooled, an outside thermostat sets the inside thermostats to the specified inside temperatures, according to the air temperatures outside. The

range of these inside temperatures is from 20 to 27° C. Thus the temperature in the coach should be 26° C. at an outside temperature of 30° C., 25° C. at an outside temperature of 28° C. and 20° C. at an outside temperature of 22° C.

When the coach is being heated, the control exercised by the inside thermostats is checked by an outside thermostat and a fresh-air thermostat. This prevents one-half of the coach becoming warmer than the other as a result of long exposure to the sun's rays on one side. It also obviates the hunting of the control system when the train passes through successive sunny and shady zones and ensures that the temperature of the supply air does not fall below the admissible minimum.

Minimum and maximum outside thermostats regulate the amount of fresh air supplied to the interior of the coach. Thus at outside temperatures between +5° and +22° C., all the air supplied is fresh, but above or below these temperatures the percentage of fresh air is reduced. An air-circulation thermostat keeps the fresh-air damper closed till the temperature in the coach has reached +15° C.

Should the automatic control systems ever be out of action, the necessary adjustments can be made by hand.

Electric Equipment

As the coach is intended for use on Swiss lines only, the air-conditioning installation is designed for use with the type of current employed on the Swiss railways. Single-phase alternating current

(Continued on page 70)

DOMESTIC REFRIGERATION DEVELOPMENTS



MR. N. F. T. SAUNDERS has been appointed managing director of Kelvinator Ltd., Bromborough, Cheshire, and has resigned from the G.E.C. organization.

Mr. Saunders served an apprenticeship as a marine engineer on the Clyde, but upon graduating from Glasgow University he went to Metropolitan-Vickers

Ltd., who specialize in the manufacture of controls and equipment for printing presses.

Mr. Saunders is a B.Sc. in engineering and a full member of The Institution of Electrical Engineers, and has the somewhat unique combination of qualifications in that he is also a fellow of the Chartered Institute of Secretaries. He is a member of the

NEW KELVINATOR CHIEF APPOINTED—Mr. N. F. T. SAUNDERS leaves G.E.C.

Electrical Co. Ltd., Trafford Park, and from there to the G.E.C., Witton, as chief designer of fractional horse-power motors, fans and motor-driven appliances. In 1934 he left the G.E.C. in order to become chief engineer, H.M.V. Household Appliances Ltd.

From there he went to Lancashire Dynamo & Crypto, Willesden, as chief engineer.

However, in 1938 Mr. Saunders rejoined the G.E.C. organization as general manager of Coldair Ltd. This company manufactures the G.E.C. household refrigerator, and under his management has become one of the most important producers of household refrigerators in this country.

In 1953 Mr. Saunders was appointed to co-ordinate the design and manufacture of all G.E.C. appliances. To facilitate this he founded and subsequently directed the G.E.C. Appliance Design Centre. In this he built up a team of mechanical engineers, physicists and technical designers, together with planning and tooling experts who, in co-operation with a team of industrial designers, are able to cover all aspects of the work involved in creating new designs of appliances. The success of this centre is shown by G.E.C. appliances now appearing, including the new "Supreme" cooker which is perhaps the most outstanding model ever put on the market in this country.

In 1957 Mr. Saunders was appointed to the over-all management of design and manufacture of G.E.C. appliances. He was also made responsible for the operation of the subsidiary company, Witton-James



Mr. N. F. T. Saunders.

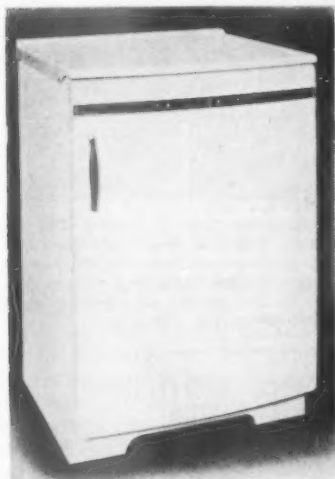
Institute of Refrigeration and a member of the American Society of Refrigerating Engineers. His wide interest in science generally is shown by the fact that he is a member of The Royal Institution. As his many friends all over the world know, Mr.

Saunders's hobby is photography, and some years ago he was made an associate of the Royal Photographic Society for his outstanding work in pictorial photography.

Throughout his career Mr. Saunders has contributed many articles to the technical press, and is the author of a very successful book "Factory Organization and Management" published by Pitman's. He has frequently lectured on design and industrial management, particularly at Ashridge College. He has been chairman of the B.S.I. Committee RFE/3 responsible for B.S.I. specifications covering household refrigerators since its inception. He is a member of council of the British Refrigeration Association and a past chairman of that body.

NEW FRIGIDAIRE REFRIGERATORS

TWO new household refrigerators were announced last month by Frigidaire Division of General Motors Ltd. They are the Frigidaire "Fours," model MZ-45 and DZ-45, which with a gross capacity of 4.4 c.ft. are available in a total of six



Frigidaire's new
MZ-45 Master
model of 4.4 c.ft.
gross capacity.

model variations. Both the "Master" and the "De Luxe" cabinets are being produced for free-standing or for building-in, and the "De Luxe" is available also with choice of left- or right-hand door.

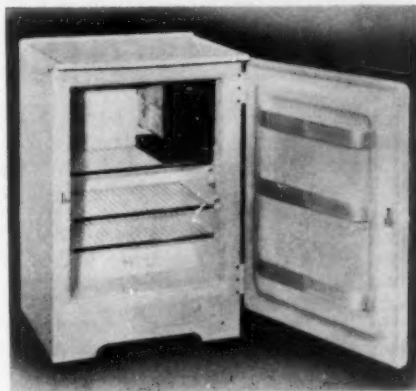
The cabinets are notable for their new styling, new features and new interior colours.

Shelf space has been increased and shelves in both models are adjustable with possible shelf depths varying from 1 in. to 15 in. The exteriors have also been streamlined and for the interiors Frigidaire have evolved a colour-cool combination of white and light blue with fittings in contrasting pearlescent dark green.

A new instant-locking safety handle has been incorporated making it possible to open the door and close it securely at the lightest touch. Also fitted is a special high efficiency door seal.

JANUARY 1959

DOMESTIC REFRIGERATION



Interior of
the **MZ-45**
Master
model.

As with all Frigidaire household refrigerators, the new models are powered by the "Meter-Miser" sealed rotary unit which is warranted for five years. Prices remain the same as in 1958.

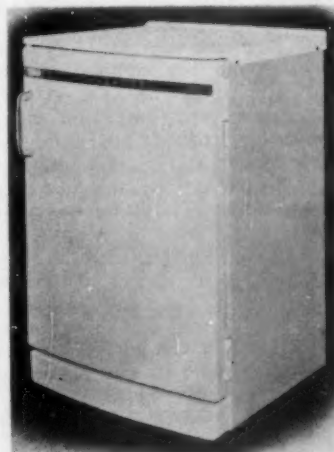
MZ-45 Master Model 4.4 c.ft. Gross Capacity

Shelf space in the "Master Four" has been increased to 8.9 sq.ft. In the door store there are now three shelves and in the cabinet the shelving is so arranged that with the evaporator on the right-hand side and extra shelf pegs, this new model can accommodate the most awkward items of food and drink. The shelves have also been given an anodized shelf trim. The super-freezer takes up to 10 lb. of frozen food.

Available for building-in, this model is supplied in cream or white. Price, including purchase tax, is 67 guineas.

DZ-45 De Luxe Model 4.4 c.ft. Gross Capacity

The 1959 "De Luxe Four" incorporates the new style door and kick plate and is available in all five



Frigidaire's new
DZ-45 De-Luxe
model of 4.4 c.ft.
gross capacity.

DOMESTIC REFRIGERATION

Frigidaire exterior colours of Olympic red, Sherwood green, Cotswold cream, Snowy white, or Mayfair pink.

In this model the door store contains a butter compartment in addition to door shelves. Shelf space in this model has been increased to 9 sq.ft.

Further features are the full width hydrator for storage of fruit and vegetables, quick cubelet ice tray, which freezes 36 handy sized ice cubes, and automatic interior light. This cabinet as well as being available for building-in can also be obtained with a left- or right-hand door. It is also available with coloured table tops, cream with red cabinet, beige with pink cabinet and matching tops for the other colours.

Price, including purchase tax, is 74 guineas.



Interior of the DZ-45 De Luxe model.

HOTPOINT WALL CHART

In a reprint now available, A.E.I.-Hotpoint have improved their wall chart issued early last year and showing diagrammatically the basic principle of the hermetically sealed system installed in Hotpoint domestic refrigerators. Clearly printed on 19 in. by 12 in. card, with key colours in red and blue, the chart now carries explanatory notes on the respective functions of the component parts. The diagram shows, in colour, how the refrigerant passes through the system with successive changes—low pressure liquid, low pressure gas, compression, high pressure gas, condensation, high pressure liquid. It has already proved invaluable as a visual aid in explaining in non-technical terms the way a Hotpoint refrigerator operates. A cut-away view of the compressor unit with its starting relay exposed shows quite simply the relationship of the electrical and the mechanical components; the electric motor, with its field coils, rotor and driving shaft which is an extension of the crank shaft of the compressor, and the compressor body itself, with its tiny piston and bore, which are finished to limits of 0.0003 in. Copies of the reprinted chart (reference TSP 582) may be obtained

free and post free from: A.E.I.-Hotpoint Ltd., technical sales promotion department, 33, Grosvenor Place, London, S.W.1.



During a visit to Astral Equipment Ltd. at Dundee, The Rt. Hon. J. S. MacLay, C.M.G., M.P., Secretary of State for Scotland (left) discussed a point of manufacture with (centre) Mr. W. Roxburgh, managing director of Astral. Here they are with two technicians in the cabinet sub-assembly shop of the Astral refrigerator plant.

NEW RANGE OF LIGHTFOOT REFRIGERATORS

A NEW range of refrigerators is now available for the domestic consumer. Marketed by The Lightfoot Refrigeration Company Ltd. they are being manufactured in Western Germany by the Linde organization, and represent the latest development in continental design and styling.

A special feature of the styling is the pale blue trim used on the door and corner plates and a new feature, the gold-coloured trim strips on the front edges of the white-plastic-covered wire grid shelves. These trim strips are easily detachable for cleaning.

All the cabinets in the new range have a large internal capacity in relation to their external dimensions. This large capacity has been made possible by the design of the sealed compressor unit and flue type condenser with which the cabinet is equipped. A notable feature of the range is the particularly quiet running of the refrigeration unit. Flexibility



Model LH 26, 9.2 c.ft. refrigerator—The Lightfoot Refrigeration Co. Ltd.

of temperature in the cabinet is provided by a manually operated six point control disc. The unit is fully suppressed against causing radio or television interference.

Considerable thought has been given to the internal layout which in all models provides a capacious froster for the storage of frozen foods and ice making. This compartment is fitted with a plastic door which hastens the making of ice cubes.

Vegetable containers are provided and these are covered by the lowest shelf which is made from plate glass, giving fixed shelf space, at the same time acting as a cover for the containers and ensuring that the contents do not become dehydrated.

Larger models in the series are equipped with a transparent plastic sliding drawer for raw meat or fish. This is fixed immediately below the froster.

The grid shelves supplied vary in number with the size of the cabinet but in all models are supported on white, easily cleaned plastic-covered fittings. Each cabinet has one or more sliding shelves, the other shelves being of the "lift-up" type; racks of various sizes designed to accommodate eggs, bottles of wine, soft drinks and tinned food and drink are built into the door thickness. Covered compartments in the door also accommodate butter and fats. A feature of these "in-door" racks is the pale blue panels with which they are faced.

DOMESTIC REFRIGERATION

Two models of the range are available for immediate delivery, the dimensions and other details being as follows:—

MODEL LH 16

Capacity	5.6 c.ft.	160 litres
External :—		
Height	45 $\frac{3}{8}$ in.	116 cm.
Width	23 $\frac{1}{4}$ in.	59 cm.
Depth	26 $\frac{3}{8}$ in.	67.5 cm.
Storage Compartment		
Height	36 $\frac{3}{8}$ in.	93.6 cm.
Width	16 $\frac{1}{2}$ in.	42 cm.
Depth	16 $\frac{1}{4}$ in.	41 cm.
Shelf area	11.3 sq.ft.	1.05 sq.m.
Supply and voltage	A.c. 210-230 volts 50 cycles	
Loading	160 watts	
Average current	0.7 kW./day	
Net weight	189 lb.	86 kilos
Gross weight	227 lb.	102.7 kilos

MODEL LH 26

Capacity	9.2 c.ft.	260.5 litres
External :—		
Height	54 $\frac{3}{8}$ in.	139 cm.
Width	28 in.	71 cm.
Depth	29 $\frac{3}{8}$ in.	76 cm.
Storage Compartment		
Height	44 $\frac{3}{8}$ in.	113 cm.
Width	21 $\frac{1}{4}$ in.	54 cm.
Depth	15 $\frac{3}{8}$ in.	40 cm.
Shelf area	17.8 sq.ft.	1.65 sq.m.
Supply and voltage	A.c. 210-230 volts 50 cycles	
Loading	175 watts	
Average current	0.9 kW./day	
Net weight	297 lb.	135 kilos
Gross weight	390 lb.	177 kilos

The external finish of the cabinets is white enamel with the distinctive Lightfoot badge decorating the domed door. The handle is a car-type slam lock working on a nylon catch and is finished in chromium plate. The storage compartment which is of one piece construction with rounded corners to facilitate cleaning, is finished in white vitreous enamel. The insulation is glass wool ensuring completely hygienic protection for the storage compartment.

All models are fully tested before leaving the factory. There is a one-year guarantee against faulty workmanship on the complete cabinet. The refrigeration unit is guaranteed for five years.

This range of domestic refrigerators continues the policy of the Lightfoot Refrigeration Company Limited to offer only the best possible quality products and to uphold their world-wide reputation the company has for refrigeration equipment for all purposes.

Prices

Prices of the two available models in the new range of domestic refrigerators can now be published.

Model LH 16 — 5.6 c.ft. — £ 90 5s. 6d.

Model LH 26 — 9.2 c.ft. — £150 9s. 10d.

DOMESTIC REFRIGERATION

ELECTROLUX NEWS

A movie camera and projector were the gift of the staff to Mr. Stanley Broughton, managing director of Electrolux Ltd., marking the completion of 25 years' service with the company. Sir Harold Wernher (right), chairman of Electrolux Ltd., made the presentation at a dinner in the Café Royal last month, celebrating a year of record sales. Among other gifts Mr. Broughton received was a Swedish glass bowl from the directors of the Electrolux Company in Sweden.



KING OF SWEDEN HONOURS SIR HAROLD WERNHER

For his services in fostering Anglo-Swedish relations, Sir Harold Wernher, Bt., G.C.V.O., T.D., chairman of Electrolux Ltd., has been awarded a coveted Swedish honour—The Grand Cross of The Northern Star (seen left). The presentation was made on Tuesday, December 16, by His Majesty the King of Sweden who is Grand Master of the Order.

Sir Harold, who has been connected with the Anglo-Swedish Society for thirty years and has been president since 1937, becomes one of the very few persons outside Sweden to receive this noble award.

The Order of The Northern Star dates back to 1748 and is a reward for services to science and the arts, and is also bestowed upon ecclesiastical dignitaries and civil servants for meritorious services. There are four classes to the order and Sir Harold, as Commander of The Grand Cross, has received the highest.

LEC FURTHER EXTENDED

THE purchase of the site of the Bognor Regis gas-works by Lec Refrigeration Limited for £35,000 is just another step forward by this very enterprising company.

Considering the firm's rapid expansion, the acquisition of this site, which is adjacent to the present factory, will add vast possibilities for production thereby enabling Lec to meet the ever-increasing demand for their refrigerators. It will also create work for many of the inhabitants of Bognor Regis which town, due to the seasonal nature of its attractions, has an unemployment problem during the winter months.

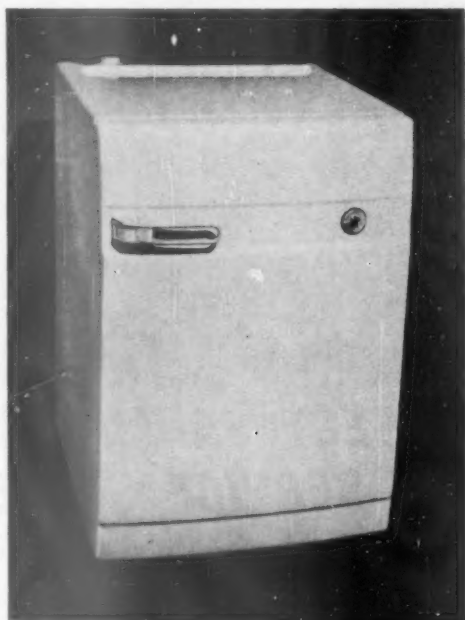
The Bognor gas-works closed down some five months ago after producing gas for the area for the past 50 years. In future, gas will be pumped from Fawley at a lower cost and the two gas-holders will remain for storage.

NEW ELECTROLUX MODEL

At a well-attended reception at the Savoy Hotel, London, on the 7th instant, Electrolux Limited launched a new domestic refrigerator for the 1959 season. Labelled the "L.26" the all-steel cabinet is available in white or cream enamel with tasteful decoration in ice-blue and gold. The food compartment is also in ice-blue and is easily cleaned. The new-type door catch with featherlight closing action has a handle made of resilient nylon. There are four shelves, one serving as an egg rack. The top shelf will take nine pint bottles, while the ice-tray will provide 14 cubes for freezing. The flat top is designed to accommodate the Electrolux "Tray Top". Main dimensions are: Height, 2 ft. 7 $\frac{7}{8}$ in. (add $\frac{3}{8}$ in. for ventilation grille); width, 1 ft. 8 $\frac{1}{2}$ in. (add $\frac{3}{8}$ in. for hinges); depth, 1 ft. 11 $\frac{1}{4}$ in. (add 1 $\frac{1}{4}$ in. for door handle); internal volume, 2 $\frac{1}{2}$ c.ft.; shelf area, 5 $\frac{1}{2}$ sq. ft.; weight, 96 lb. approx. 47 gns.

New Electrolux Model

(see page 54)



DOMESTIC REFRIGERATION

B. and C. D. Trade Exhibitions Limited announce the second Domestic Equipment Fair, to be held at Earls Court, September 17 to 26, 1959. The first two days are to be set aside for exclusive admission to the trade with the remaining week, Saturday 19 to Saturday 26, for the general public. The scope of this important exhibition embraces appliances using electricity, gas, solid fuel and oil—together with non-mechanical equipment for the more efficient running of the home. Special features are being arranged which will be of great interest to housewives all over the country. Enquiries for space should be made to: The Organizers, Domestic Equipment Fair, 194-200, Bishopsgate, London, E.C.2.

Leading directors and managers concerned with problems of selling to industry will address a new course in industrial marketing starting on Friday, January 16, 1959, 5.30 p.m. at the Department of Management Studies, St. Katharine's House, 194, Albany Street, N.W.1. These include T. G. Fielding, M.I.E.E., O.B.E., managing director of Technical General Advertising, H. W. King, purchasing director, Bowater-Eburite Ltd., and C. H. Sales, planning officer, C.A.V. Ltd. In charge of the course is Eric Shankleman, lecturer in marketing at the Polytechnic and a director of Marketing and Economic Research, Ltd.

VENDING LIQUID MILK

REFRIGERATED vending of liquid milk has proved a very considerable success in Scotland and has contributed to the first upward movement in liquid milk sales achieved since 1951. It is obviously impossible to pinpoint credit for the $\frac{1}{2}$ per cent. rise, equal to a quarter of a million gal., which was achieved over the first nine months of last year. Other factors also have assisted. Nevertheless, the 50 milk vending units now in use in Scotland have each cleared in the region of 400 to 500 gal. a month and are assisting in the expanded sale of liquid milk. The upward trend in 1958 was achieved despite a rise in milk prices, as from October 1. Other schemes are in process of development to assist in maintaining and improving this trend. Arbroath Town Council has currently approved the location of two vending machines in a housing scheme in the town, and this is typical of similar acceptance in Scottish centres.

Modern Refrigeration is obtainable from the manager, Maclaren House, 131, Great Suffolk Street, London, S.E.1, at thirty-five shillings per annum, post free to any part of the world.

SHOP REFRIGERATION NEWS



REFRIGERATION IN THE LATEST SAINSBURY SELF-SERVICE STORE

By our Special Retail Correspondent

AESTHETICALLY and hygienically the standard of food retailing in the large-scale self-service stores (not all of which are supermarkets) goes on improving. But, in neither respect have any of these giant help-yourself establishments ever surpassed Sainsbury's, whose 22nd self-service branch (there are 250 branches in all) was opened in Drury Lane, London, last month.

The temperature-controlled air-filtering and distributing system and the extensive refrigerated storage and display equipment are two of the most vital factors contributing to the unusual attractions of this store, and for the complete installations of both, York Shipley Ltd. were responsible, working in conjunction with Sainsbury's own engineering staff. Particularly noteworthy is the fact that *all* the equipment is operated by water-cooled, fully hermetically sealed condensing machinery.

Within the selling area, which covers approximately 3,000 sq. ft. are refrigerated cabinets providing 86 linear feet of display. Those on the right-hand side of the store comprise displays of quick-frozen foods, cooked meats, sausages, butter, fats and pies. These cabinets are all of Sainsbury's own design and manufacture and form a continuous run of that side wall except for the fresh fruit and vegetable fittings which are not refrigerated. All the cabinets in the shop are self-contained with their own *water-cooled* condensing plant beneath the display area: they are thus prevented from bringing any appreciable heat or noise into the store.

Apart from the frozen food cabinet, the cabinets are all divided into compartments made to accommodate the open-fronted bins in which the packaged produce is placed in the preparing rooms. The bins have perforated bases permitting the circulation of air, and come to the cabinets on trucks brought down by lift from the packaging sections. This method greatly minimizes the handling of the packs of perishable foods, for they are placed in the bins immediately they are wrapped and are not handled again until they are picked up by the customer.

For butchers' meat, ready wrapped, weighed and price marked, there is a 28-ft.-long counter, maintained at 28° to 31° F. running across the back of the shop, with the meat cutting and preparing rooms immediately behind it.

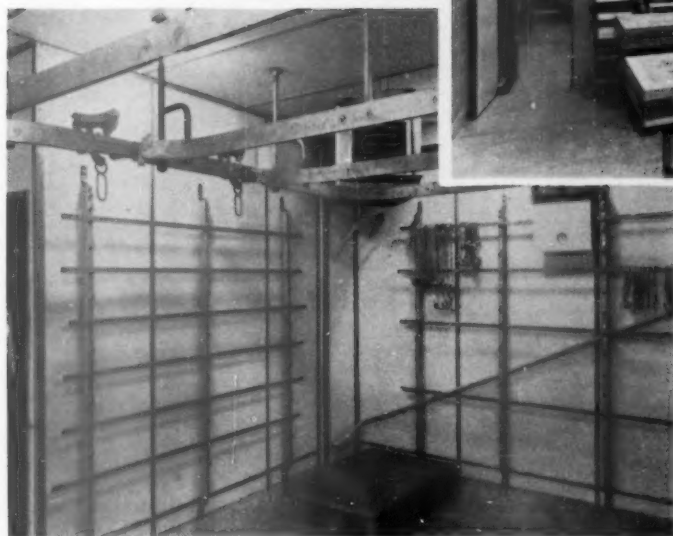
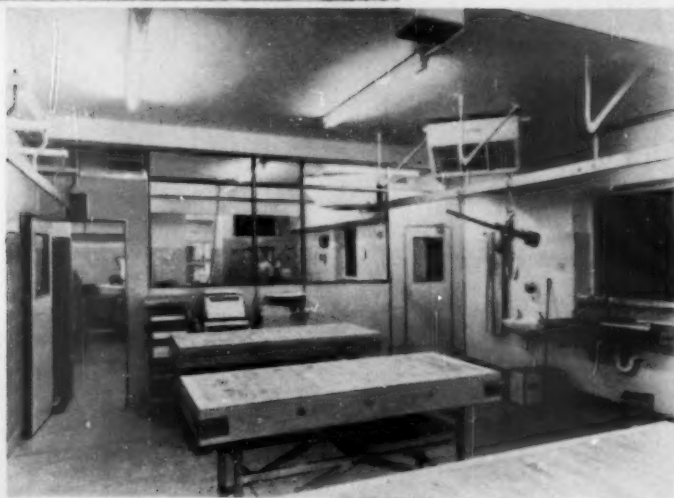
Opening off the preparing area is a cold room, held at 28° to 31° F. for the bulk storage of meat on arrival, into which the carcasses travel on overhead rails. This cold room has an "in" and an "out" door, thus ensuring that the meat is withdrawn in proper sequence, and that newly arrived stock is not so placed that it has to be moved again to permit the earlier arrivals to be taken out first.

Within this bulk store is another cold room held at a slightly lower temperature, access to which is provided by swinging rubber doors. Here the cut-up meat is kept in readiness for packaging.

After the cut-up meat has been price-ticketed and wrapped, it is placed on trays in one of a series of



Part of 42-ft. display counter served by a compact arrangement of nine water-cooled YORKOMETIC condensing units installed beneath the counter. The cabinet is sectioned to provide temperatures between -5°F. for frozen foods to 50°F.



Above: The air-conditioned meat preparation room. Left: The "ironmongery" in this cold room allows rapid transit of hanging meat.

An atmosphere of airiness has been created by this method of lighting.



10-ft.-long refrigerated tunnels, held at a temperature of 28° to 31° F., by which the preparing room is linked to the butchery department in the shop, becoming, in effect, serving hatches for the refrigerated display cabinets given up to meat.

The preparing rooms on the ground floor and

first floor are all supplied with temperature-controlled fresh air by York self-contained automatic conditioners which maintain the temperature at 60° to 65° F. throughout the year, each being equipped with a 1½-h.p. Yorkometric water-cooled condensing unit.

For holding the temperature at 28° to 31° F. in the cold store on the ground floor there are two York unit coolers with directional vanes by means of which the air flow can be adjusted. The cold room on the first floor, used for perishable provisions, is equipped with two York "Delta" coolers which maintain the temperature at 35° to 40° F. Within this cold room there are also six large compartments, independently refrigerated for storing quick-frozen foods.

A water-cooling and recirculating tower is housed on the roof.

The rubber doors are by Parker, Winder & Achurch Ltd.



The meat section has always been a main feature of Sainsbury's shops; this case is no exception.

The first installation of an addition to the Frigidaire Manhattan display case range was made at the Premier Supermarket at Croydon which opened towards the end of last year. To be known as the Superama, this three-tier refrigerated case is available, like the other standard Manhattan cases, in a number of standard lengths. The case illustrated is 24 ft. long and provides this Premier supermarket with 72 ft. of refrigerated display for dairy produce.

PREMIER'S NINETEENTH SUPER- MARKET



Frigidaire cooled salad display, sited behind one of the four-seat cubicles in the Horseshoe Room, the restaurant at Premier's new Croydon Supermarket.

PREMIER'S 19th supermarket, opened recently, provides a service to replace a service, for it is built on the site of the old Croydon Y.M.C.A. building in the main shopping centre at North End.

Of essentially simple design it incorporates a full scale restaurant below the supermarket which provides an unusually versatile menu at reasonable prices.

One of the principal features of the supermarket is the new Frigidaire Superama three-tier refrigerated display case which is being used to display 72 ft. of dairy produce in a case 24 ft. long. This addition to the Frigidaire Manhattan range is here being featured for the first time.

Refrigeration, in fact, plays a prominent part in the facilities of the Croydon Premier. At the back of the store, almost the entire width is taken up by a 35 ft. continuous run of Frigidaire Manhattan meat cases behind which, in full view of the public, lies the meat preparation room.

In addition, there is a Manhattan Island Site for frozen food and frozen poultry which consists of two 10 ft. Manhattan display cabinets placed back to back and a 6 ft. case across the end. There is also a multi-deck 6 ft. 6 in. Manhattan case for pre-packed bacon.

Behind the scenes there are four Frigidaire cold-rooms which comprise a 200 c.ft. room for prepared meat, a meat holding coldroom of 250 c.ft., one for dairy produce of 280 c.ft. and one of 200 c.ft. for quick frozen food.

This supermarket relies for its overall impact on a simple blend of plain colours, wood finishes and strip and spot lighting. The customers' attention is

A 35 ft. continuous run of Frigidaire Manhattan refrigerated meat cases separate the selling area of Premier's new supermarket at Croydon from the meat preparation room.



therefore solely confined to the carefully sited display goods.

Apart from the refrigerated displays there are basket sites for sweets and gondolas for dry goods and hardware. While the main food display cases are ranged round the walls of the supermarket, other goods are displayed in cases placed diagonally down the centre of the sales area. Features are the book stands and the confectionary racks, the latter being attached to the motorised check-out points which stretch across most of the front of the store.

Customer comfort is well catered for by the air-conditioning system installed in the ceiling. Downstairs in the restaurant, which is to be known as the Horseshoe Room, there are four-seat cubicles along the walls as well as a centrally placed horseshoe-shaped eating bar. The design is contemporary with

a sporting theme being used throughout. The refrigeration equipment for the Horseshoe Room includes a special service case containing an ice-cream storage compartment and reach-in cabinet, and a Frigidaire cooled Aero-Phreeze drinking water cooler, and salad display.

Upstairs the staff canteen, kitchens, toilets, general office and manager's office complete the facilities. The Croydon Premier will have a permanent staff of 42.

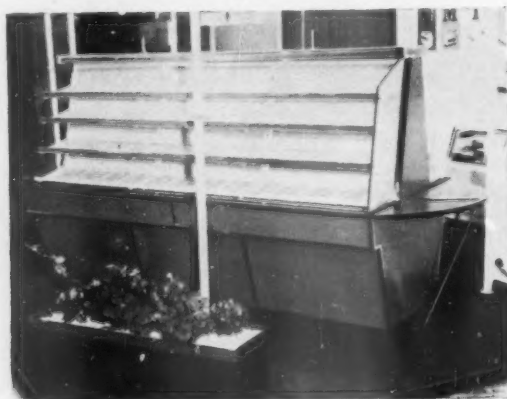
Two New Showcases by Smithfield Seen at Earls Court

(See also page 87)

For frozen foods.



Four-tier refrigerated display.





Two display cases seen at the National Poultry Show: left, one by J. & E. Hall Ltd.; right, one by a newcomer, Secura Frozen Food Cabinets.

Technical Service Laboratories for Plastics

BRITISH Resin Products Ltd. threw open to the technical press last month their service laboratories at Barry, South Wales. These two laboratories, situated on the same site as the manufacturing units of the Distillers Plastics Group, have been established for investigating problems in connexion with the processing and fabrication of polyethylene and polystyrene—also to investigate new processing techniques and applications, and to maintain a

close technical liaison with the users of Rigidex and Styron materials.

The party was welcomed by Mr. T. E. Laing, director responsible for the Distillers Plastics Group factories at Barry, who predicted that plastics might well replace steel to the extent of some 2m. tons a year within the next decade. This use alone would mean something like 100,000 tons a year.

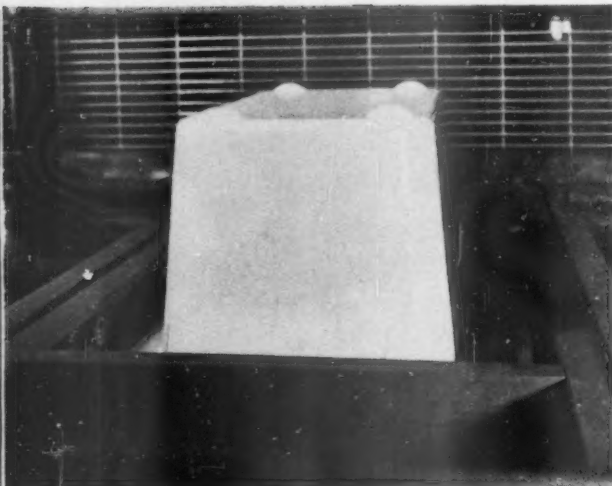
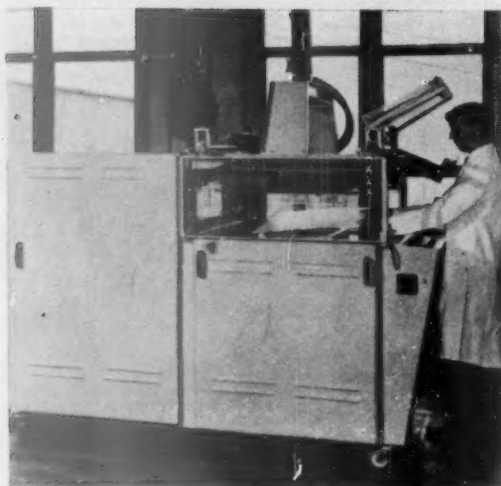
With the combined very extensive production type equipment of these

two laboratories, very full facilities are available for the investigation of technical problems associated with the processing and fabrication of polystyrene and polyethylene. Although the work of the laboratories is technological, it is augmented by the fundamental work carried out by the physical testing and analytical research laboratories at Barry and the DCL research and development laboratories at Epsom.

Of special interest to the refrigera-



Exterior view of the Distrene and Rigidex laboratories of the technical service dept., British Resin Products Ltd., Barry.



tion industry is the vacuum-forming equipment in the Styron laboratory. This includes a Daniels Latimer 30/30 machine of very recent design ; this machine is large enough to be used for commercial forming. All the forming techniques—simple ; drape ; plug assist ; and bubble assist methods—can be carried out on this equipment. All operations, apart from loading and unloading of the sheet, can be carried out fully automatically and can be used for forming Rigidex Sheet.

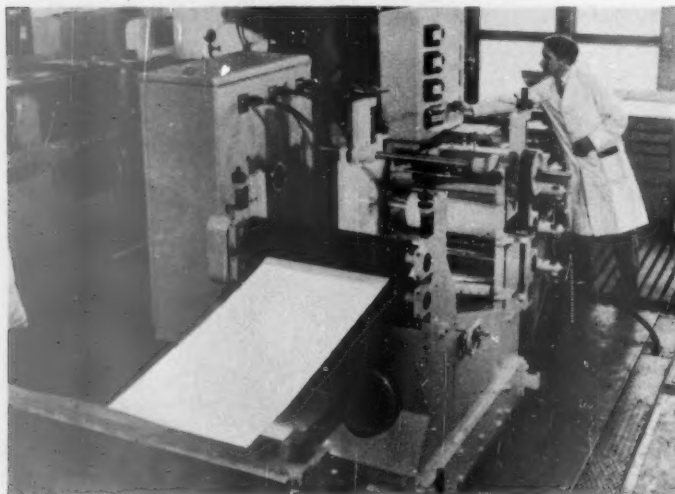
In the Rigidex laboratory, the attention of "M.R.'s" representative was directed towards the Wind-

sor 1044 Autoplas injection machine, a pre-plasticizing unit popular in the industry for moulding polyethylene. This machine is capable of producing a 24-oz. moulding, and enables moulding techniques to be examined on the same scale and under the same conditions as is found in the moulding industry. It also provides a ready means of testing customers' moulds.

Footnote : Styron polystyrene is made by Distrene Ltd. on a 10,000-ton, fully automated plant at Barry ; it is a strong, rigid thermoplastic which has many uses in industry and in the home. British Resin Products Ltd. are the sole selling agents for

Styron, which is available in several grades, the most important of which are Styron 666 and Styron 475.

Rigidex is made by a process developed by the Phillips Chemical Company who have licensed the manufacturing rights to British Hydrocarbon Chemicals Ltd., a company jointly owned by The Distillers Company Ltd. and British Petroleum Company Ltd. The material at present sold under the trade name of Rigidex is imported from Phillips Chemical Co., pending the completion at Grangemouth of a large manufacturing plant of 11,000 tons per annum capacity.



Above left :

Loading a Daniels Latimer vacuum forming machine with Styron sheet in the Distrene laboratory.

Above right :

Final stage of vacuum forming cycle showing Styron sheet drawn hard down over the mould. Object being formed is a tank; note depth of draw. Picture taken on Daniels Latimer vacuum forming equipment.

Left :

An important outlet for Styron 475 is in the extrusion of sheet for forming refrigerator liners and other large articles. This picture shows a full-scale sheet extrusion plant consisting of a Mason extruder and Bone Bros. polishing rolls and take-off equipment.

The Institute of Refrigeration Bulletin

Institute Headquarters: New Bridge Street House, New Bridge St., London, E.C.4 (CENTRAL 4694)

MEMBERSHIP

At the meeting of members held on December 4, 1958, the following were elected to membership of the Institute:—

Member

*Tait, Thomas Theodore, 15, Montague Road, Richmond, Surrey.

* Transfer from Graduate.

Associate Members

Goudie, Peter Gordon Magnus, 55, Charlwood Street, London, S.W.1.

Gurney, John Desmond, 112, Sweet Briar, Welwyn Garden City, Herts.

Williams, Frank Hooper, 21, Queens Gardens, Peterborough, Northants.

Companions

†Anthony, Frederick Joseph, 63, Peaches Close, Cheam, Surrey.

†Billinge, Kenneth Reginald, 1, Upper Thames Street, London, E.C.4.

†Greenwood, John, Oldham and District Ice Manufacturing and Cold Air Stores Ltd., Falcon Street, Oldham, Lancs.

†Maunder, Sylvanus Lloyd, "Barnsfield," Blundell's Road, Tiverton, Devon.

†Stancliff, Robert, M.C., Royal Mail Lines Ltd., Royal Mail House, Leadenhall Street, London, E.C.3.

†Tabor, Hugo Leipner, C.B.E., 29-30, Leadenhall Market, London, E.C.3.

†Toomey, Desmond Philip, 67, Preston Street, Brighton, Sussex.

†Wood, Edwin Malcolm, Armstrong Cork Co. Ltd., Kingsbury, London, N.W.9.

† Transfer from Associate.

Associates

Bowen, John Larkin, "Raeburn," Forest Drive, Kingswood, Surrey.

Clibbon, Thomas Alan, 104, Park Avenue, Ruislip, Middlesex.

Donoclift, Richard John, 64, Dock View Road, Barry Dock, Glam.

Kongshaug, Arthur L., Schouterrassen 22, Oslo, Norway.

Masters, Charles James, 31, Lancaster Avenue, Mitcham, Surrey.

Polack, David Robert, 3, Spearpoint Gardens, Ilford, Essex.

Stevens, Thomas Filmer, c/o The Kingston Ice Making Co. Ltd., Harbour Street, Kingston, Jamaica, B.W.I.

Graduates

‡Jacobs, Simeon Paul, 31, Lower Essex Street, Birmingham 5.

Puri, Surender Lal, 17, Poynders Road, Clapham South, London, S.W.4.

Rutter, John Andrew Malcolm, Blue Star Garage, Middleton Road, Gorleston, Norfolk.

‡ Transfer from Student.

A Review of the Moscow Meetings of the International Institute of Refrigeration

Symposium presented before The Institute of Refrigeration at the Institute of Marine Engineers, The Memorial Building, 76, Mark Lane, London, E.C.3, on December 4, 1958.

Commission III by G. L. H. BIRD, B.Sc., Member

IN the programme for commission III (engineering) two broad topics were included:—

(i) Automatic control in refrigerating machinery

(ii) Heat exchangers (including extended surface types).

In addition, the plenary session (on quick-freezing) of commissions III, IV and V included some important engineering contributions, and the joint session of commissions III and V dealt with automatic control and other engineering aspects of industrial plant.

In a short report it is evidently impossible to do more than to draw attention to papers of particular interest: 20 hours were devoted to papers, already concentrated in content, and any attempt to summarize these would be dangerous. Consequently, this report will be restricted to papers of particular or topical interest on plant and equipment design.

Attention is therefore being drawn to a few selected reports; shortage of time excludes more than a mention of many valuable contributions from other countries. Some papers of importance to engineers were presented before commission V and are the subject of separate comment.

1. Sh. Kobulashvili. This comprehensive summary of quick-freezing design trends in the U.S.S.R. describes a series of units designed since 1947. The author emphasizes the factors influencing design, including the specific production capacity (in tons per day per unit floor space). Multi-plate freezers are not much favoured to-day, despite their high specific capacity, due to their low production per unit and the heavy demand on manual labour. A series of blast freezers have been developed

over 10 years, mostly by the efforts of V.N.I.H.I.; these are described. They range from the 1947 model (7.2 tons per day) to 1957 conveyor model (50 tons per day). Some of these models are in use in large numbers; they include many interesting design features.

2. V. Shcherbakov. This paper, amongst other points concerned with automatic control, outlines electronic control, incorporating telephone type relays with time delay, for a complex system where compressor capacity can be varied over a wide range in accord with the nature and extent of the duty.

3. R. Pavlov. In two papers, the chief engineer of the design office for the refrigerating machine-building industry of the U.S.S.R. describes the air-conditioning plant at Moscow State University and that at the Bolshoi Theatre. The former includes a steam jet plant of 5,000,000 B.t.u./hr. capacity and is conventional except for the high degree of automatic control. At the theatre, vapour-compression plant is used of similar capacity, together with artesian well water.

4. G. Lorentzen. This comprehensive paper surveyed various methods of liquid flow control to evaporators. Dry expansion feed systems are studied. Different systems for control of flooded systems are compared, with performance data. Oil return is thoroughly considered. The author's investigations lead to some interesting conclusions about T.E.V.-fed dry expansion evaporators.

Amongst other papers read which warrant attention are the following:—

Electromagnetic Compressors. Two papers by Nesselmann and Peronne dealt with this interesting design.

Electrical simulation of refrigeration processes. Kayan reported on latest developments in a report remarkable as much for its interest as for the charm with which it was presented.

Extended surface heat transfer considerations. Von Cube, Tkatchev, Kan, and Ioffe submitted papers. That by Ioffe revealed the results of an extensive study of air-cooled condensers as used in the U.S.S.R., with valuable data on overall performance, resistance to air flow and individual surface heat transfer resistances. Kan analyses heat transfer under refrigeration conditions to finned air coolers and presents test results. Von Cube comments on economic designs for natural-draught condensers for domestic refrigerators. Tkatchev deals with the evaporator units now well-established in the U.S.S.R. for large ammonia plants.

Other papers were read by Malengret, on some Belgian heat pumps, and by Metzner on algebraic methods for solving complicated relay circuiting.

In total this is a very impressive list of technological reports.

Commission IV by J. C. FIDLER, O.B.E., B.Sc.,
Ph.D., Member

THIS brief account covers the biological part of the plenary session of the three commissions, as well as the meetings of commission IV, and deals only with the main topic, the processing of fish and meat. From a total of 33 papers, all of high standard, it has been difficult to decide which to mention in this brief summary; possibly another *rapporteur* would have emphasized different aspects.

There were five papers on commercial aspects of freezing of fish. Zaitsev and Pavlov reviewed the development of freezing of fish on board ship, in the U.S.S.R. This dates from 1888; at present (1956 figures) the total catch is 2,850,000 tons. Of this 428,000 tons are frozen; half of this being frozen on board. Only Japan freezes more fish; no other country freezes so much fish at sea. The same paper discusses the machinery and economics.

Banks and Eddie (U.K.) discussed the merits of freezing fish in consumer packs and in large slabs ranging from 30 to 100 lb. The techniques of freezing blocks at sea (*Northern Wave* experiment) and of thawing the blocks for subsequent processing or sale were discussed in detail, with special reference to the Torry experiments.

Slavin described the freezing of fish on land in the U.S.A., where about 150,000 tons are frozen annually. Frozen fish is usually stored at 0° F. in the U.S.A., but there is a trend towards the use of -10° F., and occasionally -20° F.

Minor papers described the effect of wrapping materials (Monzini, Italy) and freezing of anchovy sprats (Gakichko, U.S.S.R.). Gakichko discussed methods of thawing blocks of small fish; the optimum method was to direct a water spray on the blocks stood on end.

On freezing of meat, Jasper (E. Germany) described successful large scale trials of freezing of hogs immediately after slaughter. This resulted in improved quality and reduced loss of weight. The paper dealt also with methods of thawing. On a related topic, Jasper described the chilling of meat in two stages, (a) in a blast cooler with air at very low temperatures (-8° C.) followed by (b) holding in a cooler with low air velocity and a temperature of 0° C. Important advantages are claimed. Two papers, by Almasi (Hungary) and Abrie and Lebert (France) described freezing of packaged meat; the former of joints of pork and the latter, of deboned beef. Savings in weight loss, as well as improved use of storage space, result.

Papers by Cowan (Canada) and Lagoutte (France) covered the requisites of good frozen poultry and described methods of freezing, packaging and storage.

Turning now to fundamental considerations, Anquez (France) introduced a discussion on the definition of the term "quick-freezing," and it is possible that an international committee may be formed to consider nomenclature and standards in this field of application.

(to be continued)

FEBRUARY MEETING

At the meeting of the Institute to be held at 5.30 p.m. on Thursday, February 5, 1959, in the Memorial Building of the Institute of Marine Engineers, 76 Mark Lane, London, E.C.3, Dr. H. J. Goldsmid, B.Sc., will present a paper entitled "Thermoelectric Cooling."

The following is an abstract of Dr. Goldsmid's paper:—

Refrigeration by means of the Peltier effect is no new concept but it has only become practicable as a result of recent improvements in the properties of thermoelectric materials. Application of the basic theory of thermoelectric cooling shows that semiconductors of high atomic weight should be employed. Junctions between p-type and n-type materials with a differential thermal e.m.f. of about $400\mu\text{V}/^\circ\text{C}$. are most favourable. A particular semiconductor may sometimes be improved by alloying with an isomorphous material. For example solid solutions of Bi_2Te_3 with Sb_2Te_3 can be superior to Bi_2Te_3 itself. Using Bi_2Te_3 alloys a maximum lowering of temperature of 80°C . at a mean temperature of 17°C . may be achieved. This corresponds to a coefficient of performance of 0.5 for a 40°C . temperature difference at the same mean temperature.

The preparation and evaluation of thermoelectric material are discussed and the construction of thermoelectric refrigerators is considered. It is concluded that, while thermoelectric refrigerators are now a reasonable proposition, it is by no means clear that they are preferable to conventional refrigerators except for small scale applications.

The Refrigeration Serviceman's Association

IT is pleasant to report that the Refrigeration Serviceman's Association, whose activities had lapsed, for a time, has now been re-constituted.

Unlike many other trades, many persons believe that refrigeration is poorly served by the educational authorities in respect of practical and technical instruction at the evening colleges and schools. No doubt there is a good reason for this but the lack of this instruction provides a need for a body such as the Refrigeration Serviceman's Association who, to quote



Commander M. B. F. Ranken, chairman.

one of their aims, intend to promote such educational facilities as may be required to raise the status of the serviceman by his technical qualifications.

At the instigation of a small body of refrigeration servicemen in London, an inaugural meeting was held recently at the Garrick Hotel, London, and proved so successful that meetings are now being held at the Junior Institution of Engineers, 14, Rochester Row, Westminster, London, S.W.1.

The chairman, Cdr. M. B. F. Ranken, clearly stated in his speech at this meeting that the R.S.A. is non-political and non-partisan; the aims being

(a) to arrange a series of monthly lectures and discussions on subjects of practical interest to members;

(b) to provide service bulletins of general and detailed information of service problems;

(c) to promote a "question and answer" service by which interesting questions will be answered by experts in their own field;

(d) to arrange visits to interesting factories and plants;

(e) to promote such educational facilities that may be required to raise the status of the serviceman by his technical qualifications;

(f) to hold an annual dinner, together with other social events. There is no intention of trespassing in the field already covered by the Institute of Refrigeration.

Many manufacturers are already doing a good job in training their staffs and the staffs of their dealers, but there are many outside of these organizations who do not have the benefit of these facilities.

The need for an association of practical refrigeration men has been recognized by the number of new enrolments, former members rejoining and apprentices entering the junior grade. This is an indication of interest from those working in the trade. That employers are also interested is shown by subscriptions paying for members of their staff and of a cheque from the wholesale trade. Further interest has been shown by inquiries from manufacturers and recently from Kenya, Rhodesia and the West Indies.

Lectures have already been given on "Refrigeration controls" and "Care and maintenance of industrial plant"—two different subjects that cater for two classes of members. "Air-conditioning" and "Methods for the efficient training of Refrigeration Service Engineers."

As membership grows, it is envisaged that branches will be formed throughout the country. This will enable classes to be formed for the study of refrigeration as stated in aim (e). It is hoped that the study course will enable members to pass the City & Guilds' practical refrigeration course.

With an increase in the number of branches, lectures can be arranged for groups of branches, it not being practical for all the members to come to London. Another ambition is to provide practical instruction classes at the branches.

An interesting point brought forward at the inaugural meeting was the question of a national register. No doubt the R.S.A. could at some later date consider this step as membership of the R.S.A. would have some bearing with an employer showing him that an applicant shows an interest in his trade.

An invitation is given to those interested to attend future meetings to be held on January 12, February 10, March 10 and April 14. Application forms are available for those wishing to join at the meeting or they can be completed and sent to the secretary, 57, May Avenue, Canvey Island, Essex.



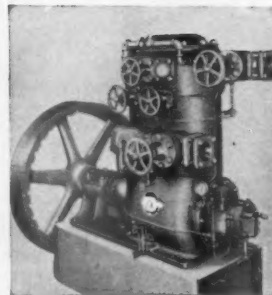
Mr. M. R. Hadrys, the R.S.A. secretary.

There are two grades of membership; full members pay an entrance fee of 15s. and an annual subscription of £2 2s.; junior members pay an entrance fee of 5s. and an annual subscription of 15s. Former members are accepted on sending their old membership card with the annual subscription. Those unable to attend meetings in London can obtain a leaflet setting out the aims of the R.S.A., together with the membership application form on request to the secretary.



COMMERCIAL AND INDUSTRIAL SECTION

Manufacturers' and distributors' news



J. & E. Hall Ltd. have announced to the customers of their Linde-Hall Canadian refrigeration division that the refrigeration contracting and service business previously carried on by the refrigeration division of John Inglis Co. Ltd. is now being undertaken by themselves. J. & E. Hall Ltd. are confident that this arrangement will make available to their refrigeration customers a refrigeration organization unsurpassed in Canada in technical resources, experience and facilities for handling new enquiries and for the servicing and repair of existing installations. The present opportunity is being taken to shorten the title under which their refrigeration business is conducted, and their "Linde-Hall Canadian Refrigeration Division" will in future be known more simply as the "Canadian Refrigeration Division" of J. & E. Hall Ltd. This abbreviation in title does not imply any change in the policy of the company, whose desire it will always be to provide the fullest continuity of service and supply of spare parts for the users of Linde Canadian Refrigeration equipment, and immediate attention to their future refrigeration requirements.

Last month, Frostaire Refrigeration Co. Ltd. opened spacious new showrooms at Refrigeration House, 115, Alexandra Park Road, Muswell Hill, London, N.10, formerly Gas Board premises. It was only in June, 1957, that Frostaire moved to Royal Parade, Muswell Hill, but so great has been the expansion in the business that a further move only 18 months later was found to be imperative. The imposing 80-ft. frontage of Refrigeration House is set with stainless steel lettering and bright neon signs. Plate glass doors open into the 1,200-sq. ft. showroom with walls of canary yellow, dazzling star-studded black ceiling, and modern louvred light fittings. A

suite of neatly divided offices leads to the warehouse premises behind. This warehouse, still in the process of building, is the main reason for Frostaire's move, for it is planned to hold nearly £10,000 worth of equipment in stock, immediately available to customers. This will avoid any bottlenecks due to manufacturers' delivery delays. The proposed new warehouse will give about 3,000 sq. ft. of storage space. It is hoped and indeed planned that all future business will be carried along the lines of delivery within 24 hours or even the same day if necessary. Frostaire are now in a position to offer most leading makes, namely Eldwood, L.E.C., Smithfield, Samuel White, Golden Hind, Craig Nichol, Winget Cooltop, Parnall and almost every better-class equipment. To a large

extent they use condensing units manufactured by L. Sterne & Co. Ltd. Coldrooms are dealt with in sizes ranging from 75 c.ft. to 10,000 c.ft., and also special built-in applications receive close attention. Mr. D. R. Polack has joined the firm in the capacity of multiple contracts manager.

Among the 250 people who attended the official opening were: Mr. A. Robinson, of Kelvinator Ltd.; Mr. E. R. Field, of L. Sterne & Co. Ltd.; Mr. Melling and Mr. Upton, of L. D. Wood (Eldwood) Ltd.; Mr. L. O. Lawrence, of Winget Refrigeration Ltd.; Mr. Cowley and Mr. Leeming, of J. Samuel White & Co. Ltd.; Mr. W. G. Marlowe, of Searle Radiator Co. Ltd.; Mr. Lewis, Mr. Burrows and Mr. Snelling, of Messrs. Birds Eye Sales Limited; Mr. Gynell, Mr. Salmon, Mr. Price, Mr. Ragett and Mr. D. E. Lewis, of Frox Ltd.; a representative from Mudd Frozen Foods Ltd.; Mr. Lang, from Findus Limited; Mr. Bowman, from Parnall & Sons Limited; Mr. Brown and Mr. Barrett, of Aero Pipe & Glass Co. Ltd.; Mr. Debruly and Mr. Hall, from the Eastern Electricity Board.



Photograph taken at opening of Frostaire's new showrooms at 115, Alexandra Park Road, N.10. In the centre is Mr. L. L. Amesbury, managing director, with members of his staff.



New 4 cylinder semi-sealed unit by Marco's.

A new technical bulletin, entitled "Enjoy butyl rubber for use in appliance applications," has been published by the Enjoy Company Inc., New York, and issued in this country by the **Esso Petroleum Co. Ltd.**, marketers in the United Kingdom of this synthetic rubber. It is stated that this material can be used in the manufacture of virtually all products broadly classified as "rubber," the excellent resistance of Enjoy butyl to chemicals (of special importance in washing machines) making it particularly suitable for rubber fittings in appliances.

D. Brook-Hart, managing director of the **D. Brook-Hart Co.**—the largest independent public relations organization in Britain—announces that he has just completed an agreement linking his firm with associates in Canada. The agreement has been made with Desmond M. Chorley, public relations consultants, of Toronto. The purpose of the tie-up is to create first-class facilities for British firms or individuals who need public relations services in Canada; and to make available to Canadian firms a full public relations service in the U.K.

G. A. Harvey & Co. (London) Ltd., have recently made the following staff appointments. Mr. K. Tardif, publicity manager, has now taken over the duties of home sales manager and will continue to operate from the company's head office at Greenwich. Mr. H. Barker, formerly deputy sales manager, has been appointed export sales manager and will also operate from Greenwich. Mr. H. F. Jones has been appointed London area manager

controlling the company's London sales office at 58, Victoria Street, London, S.W.1.

A new seven-station model cabinet for connecting up to available compressor capacity or existing cold store plant is announced by **Jackstone Froster Ltd.** The seven-station load capacity of fruit or vegetables varies from 448 lb. to 560 lb. but is 784 lb. of fish fillets. To calculate the estimated load capacity per station, operators are asked to decide on size and weight of pack it is wished to produce—multiply the surface area of plates by thickness of pack—divide the result by the cubic content of the pack. This will give the number of packs per station from which one can arrive at total weight per station and thence per froster. The first of this model off the production line has been sold for export to Eire.

There has always been an urgent need for some means of checking the humidity of the dry gases used in very many industries, the "dryness" of commercial drying plants of all kinds, and monitoring the dryness of packages, etc. A simple instrument now announced by **Shaw Moisture Meters** gives immediate and continuous recording of the humidity of even the most "dry" gases. The Shaw recording hygrometer gives full-scale deflection for readings of 5 per cent. R.H. or less and also gives warning of any increase in humidity in less than one second. Owing to the excellent long-term stability no knobs or controls are



fitted. The sensing of moisture is done by a new type of small element shown in the photograph, an improved version of the one used with the first Shaw hygrometer announced

earlier this year after a seven-year development period. As the sensing device is in the form of a variable capacitance, contamination does not present the difficulties experienced with other hygrometers which use conductive type elements. This new hygrometer with an immediate response, stable characteristics and provision for easy checking and standardizing as well as remote reading, is essentially simple, robust and reliable.

The retirement is announced of **Major C. J. P. Ball** from the boards of **British Resin Products Ltd.**, **Distrene Ltd.** and **British Geon Ltd.**, the three companies which form the **Distillers Plastics Group**. Mr. T. F. A. Board, a director of the **Distillers Co. Ltd.**, has been appointed chairman of **British Geon Ltd.** and of **Distrene Ltd.** Mr. H. H. Woolveridge, who is chairman of the **Distillers Plastics Group**, has been elected chairman of **British Resin Products Ltd.** and Mr. P. A. Delafield, who is managing director of the same group, becomes managing director of **British Resin Products Ltd.**

The Cape Asbestos Company Ltd. announce the acquisition of the whole of the share capital of **Consolidated Blue Asbestos Corporation (Pty.) Ltd.**, a company with blue asbestos mines in Cape Province, South Africa, between Kuruman and Postmasburg. This will not only provide Cape Asbestos with additional asbestos fibre but considerably strengthen their fibre reserves. Cape Asbestos are the largest producers in the world of blue crocidolite asbestos. Through their subsidiary **Cape Blue Mines (Pty.) Ltd.** they operate blue asbestos mines at Koegas and Westerberg beside the Orange River in Cape Province, at Pomfret on the border of Bechuanaland, and at Malips Drift in the Transvaal. Cape Blue asbestos is used for spinning and weaving into asbestos yarns, cloths and packings; as a filler in the rubber and plastic industries for products which are resistant to heat, acids and corrosion, such as battery boxes; and in the manufacture of asbestos-cement products.

Mr. S. Roberts, managing director of **Hoover Limited**, left England last month for a business tour of several weeks of Australia and New Zealand.

He will visit Hoover establishments, distributors and dealers in Sydney, Brisbane, Adelaide and Auckland. Hoover products are manufactured in Australia at the Hoover factory at Meadowbank, Sydney. Said Mr. Roberts: "Australia is a good market for Hoover and we are doing well there; this tour is to lay plans with people on the spot to ensure that our business continues to expand. In New Zealand things are not so good owing to the New Zealand Government's import restrictions and I want to investigate this situation personally." Mr. Roberts believes in seeing things on the spot and has journeyed overseas



Mr. S. Roberts.

to the majority of the 100 or so countries where his company does business. The present visit to Australia will make the 11th country he has been to on such tours this year.

The London district office of **The British Thomson-Houston Co. Ltd.** (manager, Mr. J. L. Dixon) is now located at 33, Grosvenor Place, London, S.W.1, and not at Crown House, Aldwych. The British Thomson-Houston Export Co. (managing director, Mr. E. V. Small) is already established at the new address. The telephone number at 33, Grosvenor Place, is BELgravia 7011.

Mr. V. Slater, manager of **Trafford Park Cold Storage Ltd.**, has been appointed a director of that company.

A new form of Pliofilm is being made available by **E. S. & A. Robinson Ltd.**, of Bristol, and it can be shrunk over irregularly shaped commodities to provide greatly improved protection and sales appeal, especially under refrigerated conditions. Known as "Shrinkwrap," the film is a heat-sealable material which can be supplied in reel form for the over-wrapping of all types of meat, poultry and frozen foods. The subsequent moderate application of heat effectively seals the overlays and at the same time shrinks the film into a smooth, glossy wrap which is much clearer than, for example, polyethylene. "Shrinkwrap" is produced by cross-tensilizing and reorientating the molecules of Pliofilm. The application of heat at temperatures of about 190° to 200° F. has the effect of returning the molecules to their former state. This results in shrinkage of up to 50 per cent. as well as a very much greater strength in the film. Research is being carried out by Robinson's on such aspects as printing, etc., and "Novo-Tite" wrapping machines for use with the new material are to be produced by Novotechnics Ltd., of Letchworth. The clarity and smoothness of "Shrinkwrap" make it very suitable for use in refrigerated displays.

Dryomatic Corporation of Alexandria, Virginia, has announced production of a new dehumidifier, the model 1500. This machine is the largest in the Dryomatic line of commercial and industrial space dryers and is suitable for moisture control in warehouses and larger commercial storage areas. It will also find application in pharmaceutical plants and chemical processing facilities requiring a continuous supply of dehydrated air. Model 1500 can remove up to 40 pounds of water per hour and will maintain humidity levels as low as 10 per cent. r.h. The machine uses two beds of permanent silica gel drying agent; while one bed removes moisture from the air, the other is regenerated by the most economical source of heat available, whether electrical, steam, or gas. In contrast to previous standard Dryomatic units which were controlled by a fixed time cycle, the alternate adsorption and reactivation periods of the "1500" are spaced by adjustable timers to provide for the most economical operation under varying

weather conditions. It requires only standard electrical connexions and a minimum of duct work for installation. It has safety devices to prevent overheating, and can be modified to include explosion-proof features to meet required safety standards. Each unit includes a humidistat to allow fully automatic control over a range of 20 to 90 per cent. relative humidity. The machine's design meets current U.S. Army, Navy and Air Force specifications covering space dehumidifiers.

The **Metal Box Co.** is marketing a new machine for inserting poultry into Diothene bags. The resulting tight pack is exceptionally neat and provides a clear view of the bird. Another advantage is the shorter freezing time required, by comparison with loose-wrapped birds, because of a reduction in the amount of air trapped inside the bag. The Raptite poultry bagging machine is simple and swift; it consists of a tapered funnel, the separate sections of which can be expanded by means of compressed air controlled by a foot-pedal. The operator first places a Diothene bag on the narrow end of the funnel. She then puts the bird in the wide end. She expands the narrow end by pressing the pedal and passes the bird through into the stretched bag, the result being a tight wrap. Closing the pack is a separate operation which can be done by staple, adhesive tape, wire tie or heat sealing. Smaller bags can be used than with loose wrapping, giving a substantial saving in wrapping material. A significant feature of the Raptite pack is that a close wrap is obtained quickly and cheaply without hot dipping. The Metal Box Co. exhibited the Raptite poultry bagging machine at the National Poultry Show, Olympia, last month.

The offices of **Metropolitan-Vickers** now located at 1-3, St. Paul's Churchyard, London, E.C.4, have been transferred to 33, Grosvenor Place, London, S.W.1. (Telephone: BELgravia 7011.)

Sheridan Croxted Ltd., the anti-static specialists, have announced the development of a general purpose anti-static spray known as "Crox-tine." This product—a self-spraying aerosol container—will prevent the problem of dust attraction on plastics, synthetic fibres and all other

static prone materials. Treated articles will remain cleaner due to a conducting layer left on the surface which dissipates any charges present and prevents any further charges being developed. The spray is pleasant in use and the resulting film is non-toxic, invisible, quick-drying and non-greasy. "Croxtine" spray is effective on all plastics and will be particularly valuable in the treating of plastic components on televisions, radios, refrigerators and cosmetic goods.

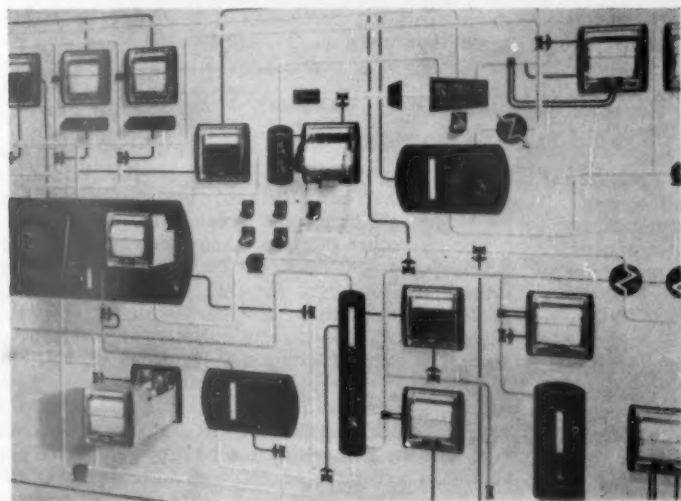
Cambridge Instrument Co. Ltd.'s new list 144/C describes a range of indicators, recorders and controllers for use with Cambridge automatic gas analysers of the thermal conductivity type. It also includes details of units for the supply and standardization of the katharometer-bridge current.

Foxboro-Yoxall's Consotrol range of indicators, controllers and recorders has been developed to meet the needs of centralized control systems. The accompanying photograph is a close-up of part of a graphic panel recently completed at the company's new Redhill factory. This photograph illustrates particularly well the use of the compact Consotrol instruments in such an application. The instruments shown here include M/54/58 pull-out recorder controllers, M/54 indicators, M/5001 ribbon indicators, M/57

switch and regulator sub-panels and various signal lights and cancellation buttons used in the alarm system. Two of the M/54/58 pull out recorder controllers are shown partially withdrawn on the left. These instruments slide in and out of a sheet-steel housing which is secured to the panel and to which are attached the external connexions. These electric and pneumatic connexions are of the plug-in type and when the unit is withdrawn from the panel a series of air check valves automatically closes to prevent loss of pressure in the impulse lines. This pull-out feature allows a complete instrument to be replaced with the minimum of interference with the process operation. It can be removed from the panel and replaced by a service spare unit on which the setting index and controller settings have been adjusted to agree with the values already obtained. Although the M/54 occupies a panel area of only 6 in. by 6 in. and can be mounted on centre lines as close as 7 in. it has a full 4 in. wide chart of exceptional clarity. The instrument in the centre of the photograph is shown with the chart mechanism pulled forward ready for chart changing, a matter of seconds only. On the left of the open instrument a M/54 indicator is shown. This instrument is in all respects identical with the M/54 recorder except that the chart drive mechanism is replaced by an indicating scale. The parts

are interchangeable with the recorder and all functions, e.g. set point change and auto-manual transfer, are the same. This means that the operator is not faced with different operations on the same panel in order to perform the same functions from instrument to instrument. Several examples of the M/5001 type of ribbon indicator may also be seen. These compact instruments provide a visual indication of process activity by means of a brightly coloured nylon ribbon which rises and falls behind a transparent glass scale in direct relation to increase or decrease of measurement. The instruments are available with single or double indicating scales and with high and low or high-low alarm contacts. The two M/54/58 recorder controllers in the top left of the illustration are linked, as part of a cascade control system with M/57 SR switch and regulator sub-panels (seen immediately below the two instruments). These small panels provide for manual operation of the control valve and manual setting of the control index from the front of the panel.

Artificial lighting is so much part of modern life that it is taken very much for granted, and it would be a salutary experience for most of us were we compelled to do without it for a time. There would be very few activities that would not be affected, such is the diversity of interests with which the lighting engineer is concerned, states *The Illuminating Engineering Society*. In a sense it was this diversity of interests and applications which brought *The Illuminating Engineering Society* into being 50 years ago. At that time the expansion of electric lighting was beginning and technical contributions were coming from many largely unrelated corners. When, on February 9 next year, the society holds its golden jubilee commemoration dinner, those present will represent a body of more than 2,500 members with 13 provincial centres plus one in South Africa and an overseas membership of more than 300. On that occasion, when the society expects to have among its guests the Lord Mayor of London, the Dean of Westminster, the President of the Royal Academy and distinguished representatives of science, government and industry, the speeches will be relayed to gatherings of members in the centres. This is believed to be the first time a



Part of a recent Foxboro-Yoxall graphic panel showing the use of the compact Consotrol range of instruments.

link-up in this way of a society or institution has been effected.

* * *

A new belting symbol has been introduced by **Turner Brothers Asbestos Co. Ltd.**, for the whole of Turner's conveyer and transmission belts. The "t" symbol is employed, the down stroke representing a conveyer belt section and the cross-sectional piece a "v" belt. Henceforth, all Turner's belting products will be marketed under this brand.

* * *

Of interest to cold store foods handling staff who have to break

and sort packs of frozen foods is the news that by the end of 1958, every **Birds Eye** pack in the cabinet carried the company's "bird" trade mark increased in size, positioned in precisely the same place on every pack, and printed against a blue background. (Previously the company was using a red background for its "prepared" products, but every kind of product will now have the blue colour on the back). When the products are displayed side by side, this overall treatment will ensure a forceful brand impact, and helps quick identification. In designing a seven-point plan for better

packaging, **Birds Eye** have kept two important considerations in mind. The company has chosen a general framework of design which will give it the flexibility it needs in introducing the new products which are sure to come along in future months. And it has also aimed to get the maximum display use out of packaging in its advertising on television, in the Press, and point-of-sale. It is, in fact, a packaging plan that is specially designed both to cope with, and help promote, the tremendous marketing advance which is expected to take place in quick-frozen foods in the immediate future.

The Frigidaire Dehumidifier

It is sometimes stated that the toughness, resilience and perseverance of the English have been built up by constant exposure to the English climate. Anyone, so visitors from abroad will say, who can stand for a lifetime the rain, damp, mist and fog that regularly descends upon these islands can stand anything.

Whether there is any truth in this view or not, one thing must be admitted. There are few climates in the world that have as their major ingredient quite so much moisture, either in the tangible form of rain or simply as damp, humid air.

In fact, apart from the physical discomforts attendant on this climatic state, there is a more serious side. Losses experienced by business in this country through materials being affected by excess moisture run every year into many millions of pounds. Tools, machinery and electrical components rust; clothing, furniture, leather goods, books and manuscripts are ruined by the precipitation of mould and mildew. And, in addition, structural decay through plaster crumbling, wood warping and metal corroding is experienced in buildings throughout the country.

It is against such a background that the **Frigidaire** dehumidifier—model **DH-1**—was released recently as a standard **Frigidaire** product. It is designed to remove excess moisture from any unventilated, enclosed space of up to 8,000 c.ft. at a maximum rate of 16 pints of water in 24 hours, and to hold the relative humidity down to 55 to 60 per cent. in dry bulb temperatures of 65° F. and above.

The **DH-1** works on a simple refrigeration principle.

The cabinet itself is formed from sheet metal, treated for rust resistance and finished in a Cotswold cream synthetic enamel. At both back and front expanded metal grilles have been provided to allow for the unobstructed passage of air.

Overall dimensions of the cabinet are 20½ x 16½ x 20½ in. high.

The condensing unit is a ¼th h.p. "Meter-Miser," and the evaporator a finned tube assembly in which the fins have been mechanically bonded to the copper tubes to give maximum heat transfer efficiency. The "Meter-Miser" motor is suitable for the following electricity supplies:—

- (A) 200 to 250 volt supply at 50 cycles.
220 to 270 volt supply at 60 cycles.
- (B) 90 to 120 volt supply at 50 cycles.
100 to 130 volt supply at 60 cycles.

The air cooled condenser, like the evaporator, is a finned tube assembly, again to ensure maximum heat transfer efficiency.

The air circulating fan and the moisture receptacle complete the major components. The latter, made in steel and finished in vitreous enamel, has been designed to rest on slide rails so that it is easy to take out and put back. Total capacity of this container is 18 pints which means that even under maximum operating conditions it need not be emptied more than once in 24 hours.

RAILWAY AIR-CONDITIONING

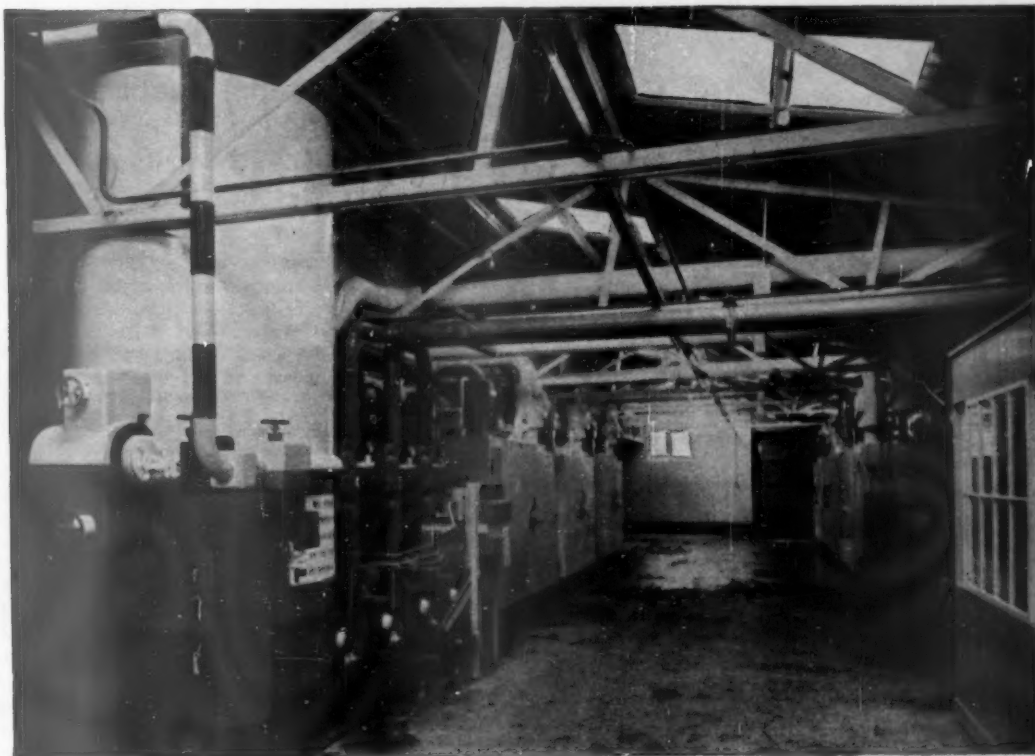
(Continued from page 49)

of 1,000 volts and 16½ cycles per second is supplied through the heating cable from the locomotive transformer. The resistance heating system and air heaters are connected direct to this supply.

For the other electricity requirements of the air-conditioning installation the voltage is transformed to 220—used for the control of the motor protector switches—and the frequency is then changed from 16½ to 50 cycles. The electro ic control system is connected to this 220-volt, 50-cycle supply, while for the adjusting units of the control system the tension is again reduced to 24 volts. The driving motors for the compressors and fans and for controlling the heating relays are connected to a voltage of 380 and a frequency of 16½ cycles, so that altogether four different voltages and two frequencies are employed for the air-conditioning installation.

REFRIGERATION

BY WILLIAMS



Part of the low temperature refrigeration plant installed for Messrs. Eskimo Foods Limited, Cleethorpes, Lincolnshire

G. Williams Engineering Company Limited were responsible for the design and installation of the complete plant which has a total capacity of 1,200,000 B.Th.U.'s per hour at -35°F .

Six Williams Contact Plate Freezers are shown and space is reserved for a further two units.

For quick freezing and storage plants consult Williams.

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We design and manufacture to your requirements

-30°F to +105°F

WITH A DIFFERENTIAL OF 3°F

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**FOR A WIDE
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COMMERCIAL
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such as:-

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SNAP ACTION SWITCH
RATED 1 H.P. (or 10 amps) A.C. NON-INDUCTIVE
½ H.P. (or 500 watts) D.C. NON-INDUCTIVE
on 110/250 volts.



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TR62

REFRIGERATION in the production of

SYNTHETIC RUBBER

Cooling facilities are intrinsic part of large-scale process at Hythe

THE fact that synthetic rubber is produced by a low temperature emulsion polymerization process at the new plant at Hythe, near Southampton, means that refrigeration plays a vital role in the out-turn of this product, the manufacture of which is new to these shores.

This £6,000,000 plant of The International Synthetic Rubber Co. Ltd., located on a 54-acre site overlooking Southampton-water, is designed to produce rubber from butadiene and styrene. Butadiene is received by pipeline from the nearby Esso Refinery while styrene is received from Shell at Partington and Forth Chemicals at Grangemouth. Other chemicals are received by road, rail and sea in solid and liquid form.

The various solutions required for the cold polymerization reaction are made up in the solution make-up area and are then, together with the butadiene and styrene, charged to the reaction system. When a predetermined proportion of the monomer charge has been reacted, the polymerization is short-stopped and the resulting latex passes to the recovery



the various stages outlined above are as follows :—

Solution Make-up

Fresh butadiene is blended with recycle butadiene. Excess recycle butadiene is returned via pipeline to the Esso Refinery for repurification. The blended butadiene is pumped from the tank farm through a scrubber to remove the inhibitor and thence via

The demand for rubber has, during the last 20 years, outstripped the world's potential production. U.K. consumption of natural rubber in 1958 was, for instance, running 19 per cent above the 1947 level, whereas the consumption of synthetic during the same period rose 2,240 per cent. In the U.S. and Great Britain respectively, the share of all types of synthetic in the total consumption of rubber was 64 and 26 per cent. One of the reasons for this difference is the higher ratio of passenger to commercial tyres in the U.S.A. I.S.R. can produce all Britain's requirements of S.B.R. synthetic rubber. British purchase of S.B.R. rubber, before this new industry came into being at Hythe, was costing more than \$25,000,000 per annum, equivalent to half the nation's dollar trade gap for the month of July. The brand name for I.S.R. is INTOL, the output being spread between three main types with differing properties—INTOL 1500, INTOL 1532 and INTOL 1710. The last is a rubber extended by 31.5 per cent. of a special aromatic oil.

system where the unreacted butadiene and styrene are removed from the latex. The stripped latex is then blended and oil extender, if required, is added as an emulsion.

The next step is the coagulation of the latex to yield a slurry of rubber in aqueous liquor. This slurry is filtered and washed, and the crumb is dried and finally compressed into bales. The details of

surge tanks and metering systems to the reactor train.

Fresh styrene is blended with recycle styrene. The resulting blend is pumped from the tank farm via surge tanks and metering systems to the reactor trains.

The emulsifier solution for the reactors is prepared. Rosin soap or fatty acid soap, and other materials are dissolved in water together to form the emulsifier

solution, and pumped via metering systems to the reactor trains.

The activator solution is prepared and is similarly pumped to the reactor trains.

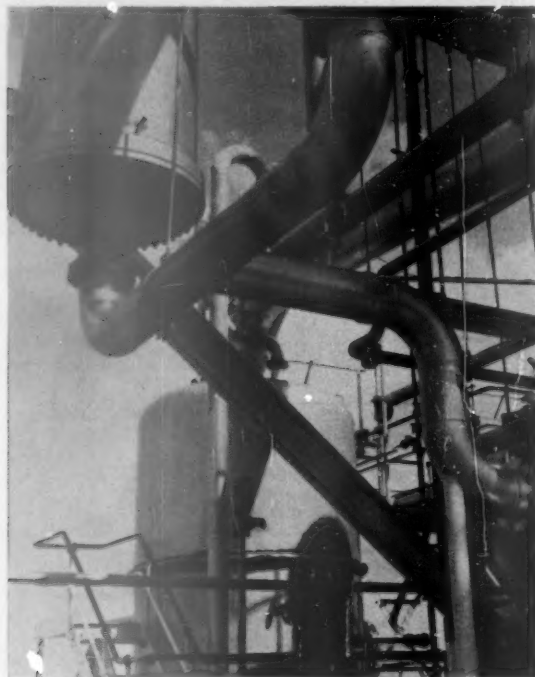
The modifier is pumped by metering pumps to the reactor trains. A similar procedure is followed for the catalyst.

Polymerization

The butadiene, styrene and various other solutions are combined together in a single charge pipe which passes first through exchangers cooled by sea water and then via exchangers cooled by an ammonia refrigeration plant. The outlet temperature of the charge stream from these latter is adjusted as may be required for the polymerization reaction.

At this stage the activator is added to the charge stream and this latter enters the first of the train of reactors in series.

The whole polymerization operation is continuous and the rate is controlled by varying the amount of



Heat exchangers outside recovery building.

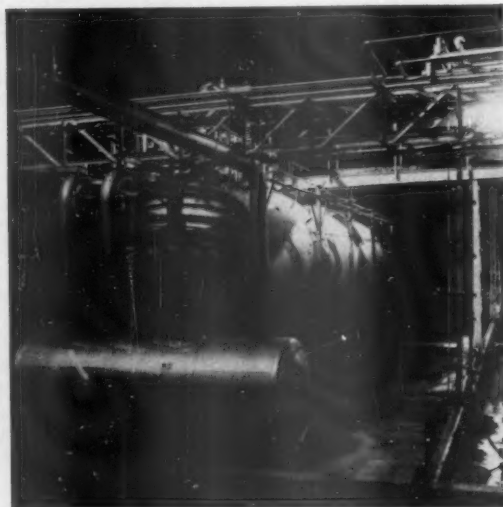
activator solution and catalyst solution charged. The plasticity or Mooney viscosity of the polymer is controlled by the amount of modifier charged.

Polymerization is stopped by the addition of short-stop. This is done in a series of displacement columns which succeed the reactor train. The latex then passes to any one of six latex surge tanks where

it is heated by the direct addition of steam. This raises the temperature of the latex and so increases the vapour pressure of the unrecovered monomers. The recovery of these latter is thus facilitated when the latex passes to the recovery area.

Recovery of Butadiene and Styrene

The hot latex from the latex surge tanks passes first to pressure flash tanks where the majority of the



Butadiene tank farm.

butadiene is removed, and then to vacuum flash tanks where the remainder is removed. The butadiene vapour thus collected is compressed and condensed and pumped to the recycle butadiene storage tank.

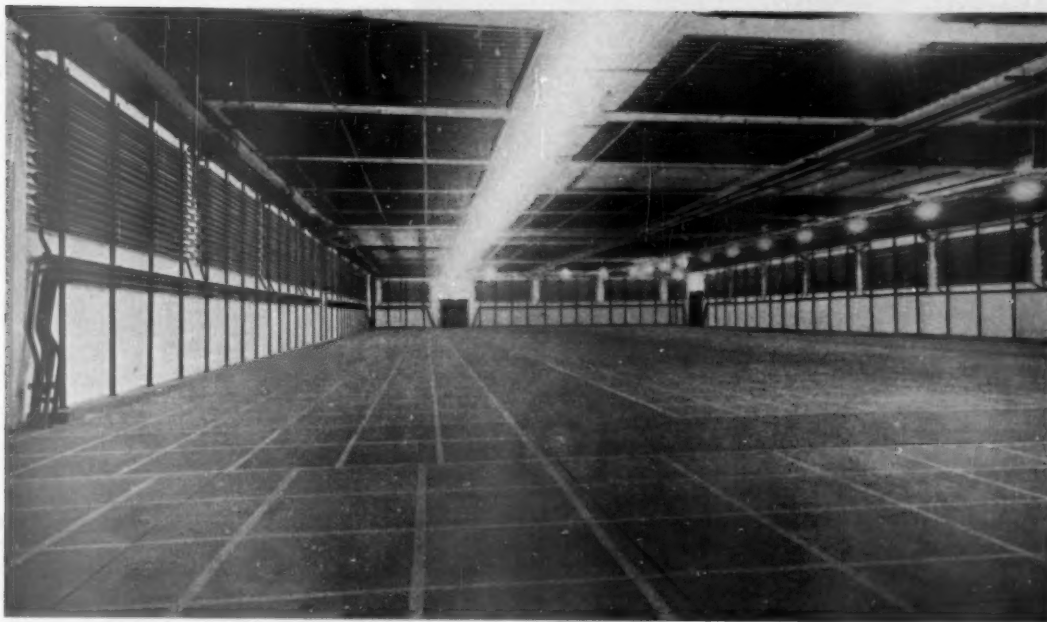
The partially stripped latex now goes to the styrene stripping columns where by a process of steam stripping under vacuum the unreacted styrene is removed. The styrene vapour/steam overhead streams from the columns are condensed and the styrene, separated from the water by decantation, is pumped to the recycle styrene storage tank. The latex is now completely stripped and passes to one of the stripped latex storage tanks.

Finishing

The blended latex from the latex storage tanks is pumped to one of four blending tanks and at this stage oil emulsion may be added to the latex if it is required to produce oil extended rubber. Antioxidant is also added in emulsion form to protect the rubber after coagulation when the wet crumb is being dried.

The latex now passes to the coagulation stage. This takes place under conditions of vigorous agitation. The resulting crumb and serum overflow into a second agitated vessel known as the soap conversion tank. From this the slurry overflows to a vibrating

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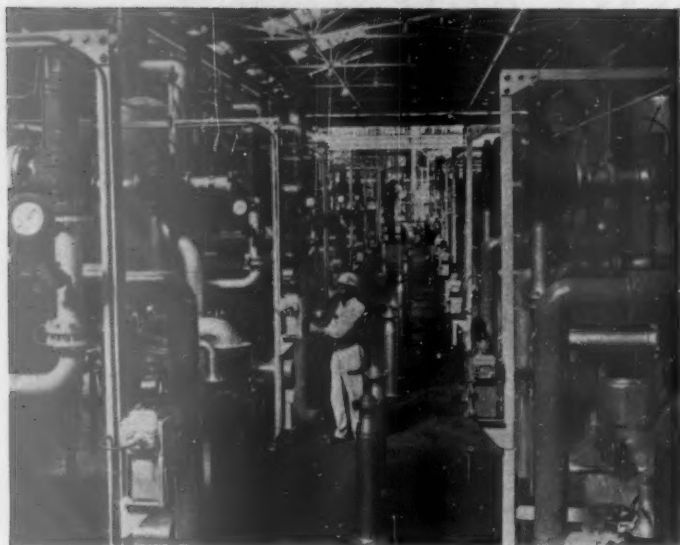
walls and ceiling of the cold chamber and some idea of the immensity of this room can be gained from the fact that 140 London buses could be parked comfortably inside it. These are only two—even if the two largest—of more than 60 cold rooms which we have been privileged to equip for Birds Eye during the past eight years and we are proud of the knowledge that the major part of our business is made up of such repeat orders from world leaders in many industries.

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The operating floor gives a clue to the immensity of the reactor building.

screen where the serum and coagulum are separated. The coagulum falls from the end of the vibrating screen into a reslurry tank where it is then washed by the addition of dilute filtrate from the filters.

The slurry from the reslurry tank overflows to a rotary vacuum filter where the aqueous phase is removed partially by the action of the vacuum and partially by the action of externally applied squeeze rolls. The cake of rubber crumb then formed discharges to a hammer mill where it is broken down

once more into discrete crumbs. These latter are fed pneumatically to the top conveyer of a three-conveyer drier. The moisture content of the crumb on entering the drier is of the order of 50 per cent per cwt. on the dry rubber and in passing through the drier the moisture content is reduced to approximately 0.5 per cent. per cwt.

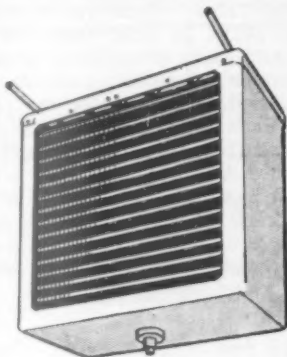
From the discharge of the driers the rubber is fed via automatic weigh scales to balers which produce an 80 lb. bale of rubber.

The styrene stripping columns at Hythe.

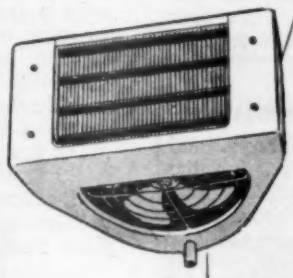


Kelvinator

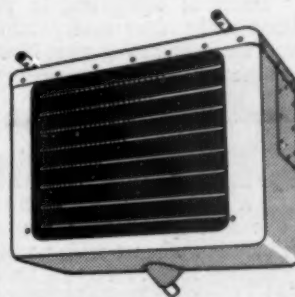
have all the answers



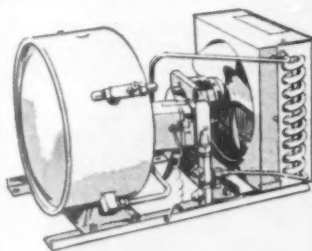
LTE COOLERS



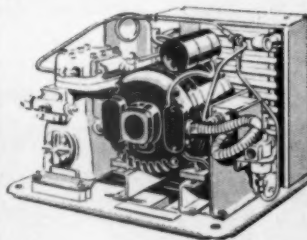
CFC COOLERS



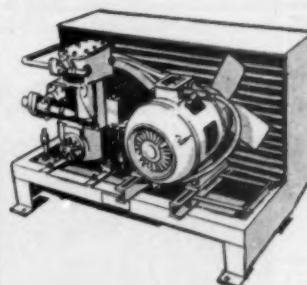
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These bales pass via a metal detector to either film wrapping machines or dusting machines and bagging machines. Finally the bales pass to the rubber storage building which is capable of holding 3,000 tons of rubber.

The plant capacity is handled in the finishing area by four trains of equipment in parallel, *i.e.* four coagulation tanks, four rotary vacuum filters, four driers etc., until the baling stage is reached when two-train operation is resumed.

Refrigeration Plant

The refrigerating plant supplied by L. Sterne and Company Ltd., to Matthew Hall Ltd., for the International Synthetic Rubber Co. Ltd., was designed to develop a total capacity of about 1,600 tons refrigeration when working with an evaporating temperature of 16° F. To deal with this requirement, four large mark 4Z14 four cylinder 14 in. bore x 12 in. stroke ammonia compressors running at 300 r.p.m. were supplied. These machines are driven by 425 h.p. motors.

To protect the compressors against accidental slop-over of liquid from the evaporators, a suction trap 47 in. diameter by 10 ft. high is fitted in the suction line to each compressor. This is provided with a heating coil through which liquid from the receiver is passed in order to evaporate any liquid

which may be deposited in the trap. A high level switch is fitted to stop the compressor should the trap be over-filled.

The condenser consists of twelve shell and tube units each with a shell about 37 in. o/d and with 20 ft. long internal tubes. These twelve units are arranged in four stacks of three units, the three units in any one stack being connected in series both for water and ammonia and provide a cooling surface of 4,740 sq. feet, making a total for the plant of 18,960 sq. feet. Each stack of condensers can be individually isolated from the discharge and liquid lines and is provided with a relief valve.

The liquid condensed drains into a 60 in. diameter by 20 ft. long receiver which is fitted with a liquid level gauge and a 2 in. dual relief valve assembly. The liquid is fed from this receiver to the customer's plant, through the coils in the suction traps.

Gas Purger

A non-condensable gas purger is also fitted on this plant to enable the equipment to be kept free of non-condensable gases with a minimum loss of ammonia.

The majority of the pipeline fittings, such as valves and flanges, were also supplied by L. Sterne and Company Ltd., though the erection of these pipelines was done by others.

Sterne's heavy duty 4-cylinder machines in the refrigeration machine hall.



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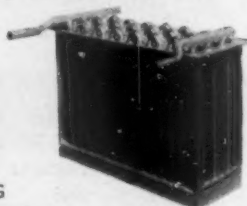


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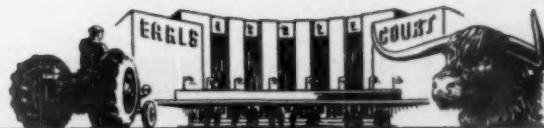
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MODERN REFRIGERATION January 1959

The Smithfield Show —A “Shop-Window” For Refrigerated Cases



SEVERAL new pieces of commercial refrigeration equipment were on view to the trade and public for the first time at the Smithfield Show and Agricultural Machinery Exhibition held at Earls Court, London, last month.

The stands of the eight exhibitors from this industry were conveniently grouped, as heretofore, in a compact section in the gallery.

Other pieces of equipment were highlighted. These illustrated the wide range of equipment available to meet the need, whether small or great, of every trader. The first was the economical 4 ft. 6 in. counter display unit, model AOD-6, introduced by the company earlier last year for displaying cooked meats and dairy produce. The other was “Frostmaster” electric defrosting equipment which was demon-



Refrigerated display was the theme chosen by Frigidaire Division of General Motors Ltd. on their stand. Cases on exhibition ranged from those suitable for the display of frozen food to those operating at 28° to 32° F. for pre-packed meat and at 40° to 42° F. for provisions and dairy produce. A feature of the stand, still with the emphasis on display, was a specially constructed butcher's window complete with refrigerated window bed. This bed was tailor-made to illustrate how refrigeration can become as much a part of the shopfittings as the old marble slab used to be. Another exhibit was the new Frigidaire-cooled large-capacity frozen-food case model AFD-115, which was being shown to the public for the first time. This was recently added to a standard range of display cases which now includes cases for pre-packed meat and provisions. This suite of cases has been developed to enable traders to build up their refrigerated display over a period of time while being able at the same time to continue in one matching style. Apart from a number of other standard products on show, two

strated throughout the show and was also installed in a 150 c.ft. cold room.

J. & E. Hall Ltd. showed a wide range of commercial and industrial plant which included large six-cylinder veebloc compressors, down to a 6 ft. frozen food display unit. Of great interest was an open-topped, refrigerated, self-service counter, type RF 800 called the “Selvis,” which has been designed to give a continuous run of refrigerated display of produce and has a temperature range suitable for dairy produce, fresh and frozen meats, poultry, and garden produce. The front height of the counter has been specially designed to achieve maximum visibility of produce within the refrigerated area and makes it easy for the customer to reach for the selected items. Exterior of counter is faced with Melamine plastic (with a choice of colours), and the front service line is provided with a wide stainless steel trim to withstand hard wear of shopping baskets etc. The trim also acts as a reflector for the front illumination of the produce. The recessed plinth is faced with p.v.c. to



★

withstand washing of floors and behind this plinth, which is removable, are the various controls for both lighting and refrigeration. A visual thermometer is provided in the counter design to indicate the temperature within the refrigerated area.

The central feature of the **Husmann British Refrigeration** stand was a 24-ft.-long refrigerated display case from the "Mass Display" range. All cabinets in this range are obtainable in units of 6 ft. and 9 ft. and may be multiplexed up to form runs of various lengths, operating at varying temperatures to suit the requirements of the different commodities on display, whilst maintaining the completely uniform appearance of one cabinet. The 24 ft. case on the Husmann stand exemplified this in that it was operating at three different temperatures; one section for home-killed meats, one for imported meats and one for frozen

foods. Cabinets from the Mass Display range were also on show in 6 ft. and 9 ft. lengths for fresh meats and frozen foods and poultry. The Husmann "Cascade" was also included among the exhibits as being of undoubted interest to the many butchers



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installing the insulation at their 2,000 tons capacity Modern Cold Store
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who stock such allied items to their fresh meat trade as game, cooked meats, etc. This three-tier refrigerated display cabinet was first introduced in October 1957, and was, in fact, the first case of its type on the British market. The forced air system of refrigeration maintains a constant temperature of 38° to 42° F. throughout all three shelves. Cold air flows from the back of the shelf through and over the display, cascades over the shelf edge and flows downward. The air is still cold when it enters the return duct. An invisible blanket of cold air is thus formed over the entire display area, keeping warm air out of the case. Other exhibits included the popular two-deck 2-DM-6 cabinet for fresh meats and the versatile OSD model, which may be used as a window bed display case, on an existing counter top, or on its own counter carcass as a compact, free standing model.

Kelvinator Ltd. featured condensing units of $\frac{1}{4}$ h.p. to 3 h.p., cooling coils and control equipment, a 16 c.ft. service cabinet, frozen food merchandisers, "Senior" and "Junior" counter top display units



for poultry, cooked and fresh meat, and the "Crystal Tips" automatic ice-making machine, incorporating the Kelvinator K4S2CRE $\frac{1}{4}$ h.p. sealed unit.

Lec Refrigeration Ltd., who showed for the first time, took the chance of displaying the Coronet P.2, one of the lowest priced British domestic models at £39 2s. 2d.: the S.13, a service cabinet priced at £111, which, with a capacity of 13 c.ft. and with its large shelf area and occupying only a minimum of valuable floor space, has been designed to meet the exacting requirements of the hoteliers, caterers and similar commercial users: the C.D.6 counter server; introduced by



Lec in the early part of last year it is an entirely self-contained open counter top display and is equipped with a space-saving, hermetically sealed condensing unit which is neatly housed at one end in a compartment with a blue moulded fibre-glass top featuring an illuminated sign at the front: the R.C.6, a three-quarter vision refrigerated display counter; this has a shelf area of just over 20 sq. ft. and a large fluorescent-lit viewing area giving excellent point-of-sale display: the FF.958, a frozen food cabinet, holding as it does £30 worth of frozen food when fully loaded, can quickly repay its capital cost in profit earned.



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Marco Refrigerators Ltd.'s exhibits included a 150 c.ft. coldroom complete with the Marco automatic defrosting equipment; part of this was cut away. The accent on this stand was on medium temperature display and storage cabinets with equal appeal to the family butcher or self-service store. Foremost in the medium temperature range of display cabinets was the "Marquis"; on show was a 6 ft. model. The Marquis series is also available for frozen food display and storage and in 8 ft. lengths. These cabinets can be obtained as wall models with canopy, as aisle models or with serving shelf. An ever popular medium temperature display was the Marco "Counter Top." This model can be mounted on an existing counter or fitted into a window. The condensing unit is situated remote from the counter top ensuring maximum display area. Frozen food retailers were interested in the "Marcold." This 11 c.ft. gross capacity cabinet occupies relatively little floor space. The "Serviseal" condensing unit, a most important part of Marco equipment because of its reliable and economic operation, was featured in a wide range from the small unit required for frozen food cabinets to the latest, very compact, four-cylinder model.

A selection of the comprehensive range of refrigeration equipment manufactured by Prestcold was on display and among the refrigerated display and sales cases were the new Prestcold 8 ft. double-fronted "Parade" case, the "Bedford Self-serva" case, the Prestcold three-quarter view display counter for cooked meats, sausages, pies, etc., and two models from the OFC.353 range for frozen foods, the "Promoter" and the recently introduced new version, the "Retailer." The storage of ice cream and frozen food was covered by the CC.501 and CC.83 conservators, while of special interest was the



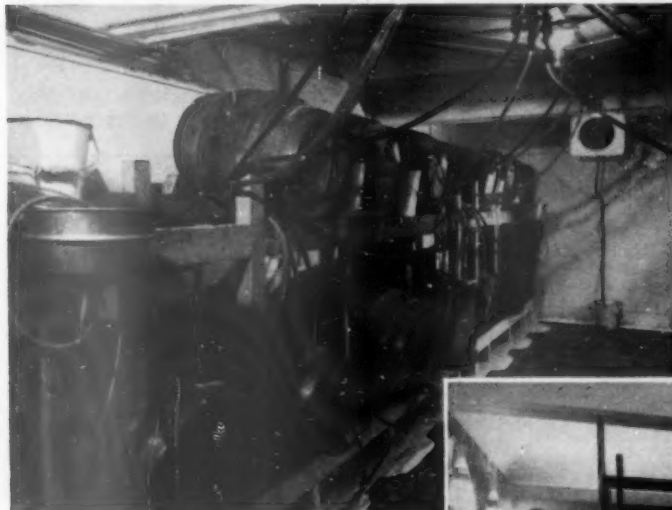
HF.51 Prestofreeze junior home freezer. Service cabinets included the 14 c.ft. SC.141 with door shelves, the 17.3 c.ft. SC.176 with meat hanging rails and the 28.5 c.ft. SC.258 which has the additional refinement of a frozen food locker. Larger installa-



tions were not forgotten, and two of the famous Prestcold units, which are produced for operating coldrooms, were typified by the $\frac{1}{4}$ and $\frac{1}{2}$ h.p. condensing units from the A.S. range powered by the Prestcold Super Presmetic motor compressors. A 150 c.ft. "Cleanline" meat coldroom operated by one of these units was on display, complete with the Prestcold "Defrostermatic" automatic hot-gas defrosting system.

The Smithfield Refrigerator Co. Ltd. featured some new additions to their line of display cabinets, including an island site self-service counter of revolutionary design, model G6125. The great advantage of this design is that 60 sq. ft. of well positioned display space are provided, while only 30 sq. ft. of floor space are used. The four shelves on each side are fully adjustable. External dimensions are: 8 ft. long x 4 ft. x 5 ft. 3 in. high. An attractive new

frozen food counter of 9 c.ft. capacity, having half-glazed sloping front giving a better view of produce, model G794 was also included. A mirror is set in the canopy to give a second, reflected, view of the display. A fluorescent light in the canopy gives brilliant illumination. The counter exhibited was finished in blue and white, but any colour scheme can be supplied. External dimensions are: 4 ft. 9 in. front x 2 ft. 5 $\frac{1}{4}$ in. x 4 ft. 3 in. high including 1 ft. 3 in. high canopy. An island site refrigerated counter for the display and self-service of frozen produce, G464, represented the latest trend in design and incorporates a very efficient cooling system. Loading and service are easily accomplished from either side of the 24 sq. ft. display area. The counter can be supplied in any number of colours and finishes and in a range of sizes. External dimensions of counter illustrated: 8 ft. long x 4 ft. x 3 ft. 4 in. high.



Beer Cooling Installation

Left: Beer in the cellar at Brystone House, Bournemouth, is cooled by two cooling units (one of which is shown here) operated by a Prestcold 1 h.p. condensing unit.

Right: One of the attractive bars at Brystone House. Altogether the hotel has no less than 10 Prestcold bottle cooling trays varying in length from 4 to 7 ft. and operated by a $\frac{1}{4}$ h.p. condensing unit.





NEWS

with particular reference to the *Bulletin of the International Institute of Refrigeration*. No. 5, Vol. 38, 1958

By DR. EZER GRIFFITHS, O.B.E., F.R.S., President of the General Conference, I.I.R.

THE technical board met at Moscow on September 1 and 2. It considered reports from the presidents of the various commissions. Two new working parties were set up, one to consider tests and safety recommendations on small hermetically sealed units and the other on testing methods for insulated refrigerated and mechanically cooled vehicles.

Following the meetings of the technical board, commissions 3, 4 and 5 held meetings in Moscow, whilst commissions 2 and 7 met in Prague (already reported in these columns). A sub-commission of commission 6 held its meetings in Paris. This sub-commission studies problems in the field of biology and medicine.

The *Bulletin* contains items of information as to research work in hand in various parts of the world; we note that the air-conditioned storage of rice grains is being studied in Japan and a variety of engineering questions such as "Automatization of ammonia refrigerating systems."

About four pages of the *Bulletin* are devoted to an account of the problems of refrigeration under investigation at the Leningrad Technological Institute of Refrigeration.

A paper published in Sweden deals with thermodynamic data for ammonia water-solutions. Included is information on solutions with 2 per cent. CrO_3 which finds application in the Platen-Munters absorption refrigerator. There is an abstract of a comprehensive article published in the U.S.A. on "Heat transfer fundamentals." It includes 250 references to the literature. Another paper from the U.S.A. describes a thermal conductivity apparatus for operation near room temperature.

A paper published in Poland contains graphs for computing cooling performance and power consumption in refrigerator compressors.

Heat transmission in finned tubes is the subject of one of the abstracts. It is pointed out that heat flows and electric currents correspond to similar differential equations so it is possible to carry out measurements with ease using an electric pattern when the theoretical heat transmission equations are too intricate. Yet another abstract contains two charts to determine the coefficients.

From the U.S.S.R. there is a paper describing an eleven-stage oxygen turbo-compressor. Another abstract from that country describes a million k cal.

per hour capacity refrigerating plant for a petroleum processing installation.

Absorption, steam ejector and thermoelectric plants are the subjects of three of the abstracts.

Freeze drying is the subject of three abstracts.

There is an abstract of a paper on the Isoschaum process for producing insulation *in situ*.

Numerous abstracts deal with air-conditioning and these include air-conditioning in mines, railway cars, submarines and aircraft.

Marine insulation is the subject of two abstracts; in one, stress is laid on the effect of convection in the insulating material due to air currents set up by leakage from the air circulating system.

It is claimed that an air separation installation for producing tonnage oxygen built in the U.S.S.R. reduces production costs by 18 per cent. compared with that of the usual high pressure installation.

A group of abstracts are devoted to electrical topics, such as superconductivity and dry batteries operating at temperature extremes.

Meat problems are the subject of a number of abstracts such as quick cooling, factors affecting quality of prepackaged meat and weight changes in frozen meat during transport from cold store to retail network.

It is recorded that an increase in weight from 0.5 to 1.37 per cent. may occur due to condensation of moisture from the ambient air.

In a paper from the U.S.A. the limitations of the immersion freezing procedure for poultry are set out.

About 18 abstracts refer to milk preservation topics. Much work is in progress on fish cooling and storage and a long abstract describes Canadian work on the application of refrigerated sea water fish holding to a halibut fishing vessel.

Reference is made to an indicator for use in frozen food packing cases to check on temperature from the time the food is packed until it is unpacked at the retail outlet. If the temperature rises above a desired point, the indicator changes from yellow to red in a certain time.

From Italy comes a paper dealing with sanitary problems specially related to the production and refrigeration of ice-cream; another from the U.S.A. is concerned with fast hardening systems and yet another from the U.S.S.R. on physico-chemical changes in ice-cream on prolonged storage.

Two abstracts refer to the baking industry: (1) moisture migration in frozen canned bread; (2) freezing and cold storage of bakery products.

There is an abstract of a paper on the microbiological quality of precooked frozen meals.

About two pages of the *Bulletin* are devoted to papers relating to statistics of the refrigerating industry.

Regulations and standards are dealt with in three abstracts. The Air-conditioning and Refrigeration Institute of the U.S.A. has issued a standard for unitary heat pump equipment.



Frozen Foods and Equipment Exhibition Blackpool September 8th to 15th 1959

This is the first time that an Exhibition of this character, devoted entirely to Frozen Foods, has been held in this country. In addition, there will be a special section given over to all types of refrigeration equipment and ancillary products. With Blackpool* being the venue, it is bound to attract record crowds. (* Blackpool has 300,000 visitors per day.)



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Success story for Sussex refrigeration firm

Lec refrigerators, both domestic and commercial, are now available in sizeable quantities and are attracting highly appreciative comments from housewives, shopkeepers and caterers.

The rise of Lec Refrigeration Ltd. is a remarkable success story evolving from just another business 13 years ago to a major force in the refrigeration market. From the ultra-modern Lec factory at Bognor, Sussex, refrigerators now go to markets all over the world, including some of the most difficult for British exporters to penetrate. The secret of Lec's success is contained in the slogan "Luxury Refrigeration at Lowest-ever Cost." Low costs are achieved by the greatest possible standardisation of components and by the latest engineering methods which cut manufacturing time to a minimum. On the other hand,

flexibility ensures that the latest improvements in refrigeration technique are immediately incorporated into all models. In this way the consumer gets an advanced refrigerator with all the latest features at the lowest possible cost.

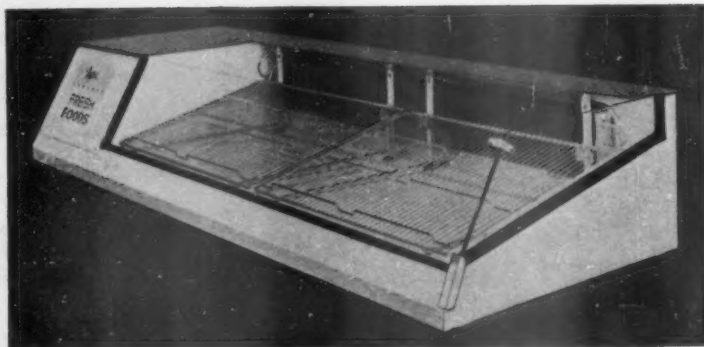
WIDE RANGE OF LEC MODELS

One of the results of the LEC policy of flexibility is the large number of models available. In the commercial field alone there are 10 models from ice-cream conservators to refrigerated display units. This is apart from the special refrigerators fitted in the latest Bristol Britannia and de Havilland Comet IV and the sub-zero temperature cabinets in use in the research laboratories of many leading manufacturers.

Leconomy gives you — FRESHER FOOD • HIGHER PROFIT

Food is shown at its most desirable in this attractive LEC refrigerated counter server. The LEC CD 6 gives an unobstructed view of the goods, together with complete hygienic protection. It has a capacity of 6.3 cu. ft. yet takes up only 6 ft. x 2 ft. 3 ins. of counter space. Beautifully finished in white enamel.

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LUXURY REFRIGERATION AT LOWEST-EVER COST

INTERNATIONAL NEWS

Pakistan

Mr. M. L. Naqsh, assistant secretary (agriculture division) Ministry of Food & Agriculture, Government of Pakistan, Karachi, has told the United Kingdom trade commissioner at Karachi that he would like to receive literature and quotations (c. i. f. Karachi) for cold storage plants from United Kingdom manufacturers. It is understood that Pakistan wishes to set up cold stores with a total capacity of 15,000 tons. Of this 5,000 tons (probably one large plant) would be in Karachi. The remaining 10,000 tons would be divided equally between East and West Pakistan, each of which would have five 1,000-ton plants. In East Pakistan the plant would be used for storing fruit, fish and potato seed: in West Pakistan the plant would be used for fruit, fish and vegetables. Mr. Naqsh says that it would probably be necessary for United Kingdom suppliers to send out technicians to put the plants into operation and supervise their running for an initial period.

Manufacturers interested in this enquiry should write direct to Mr. Naqsh, copying their letters to the United Kingdom trade commissioner, First Floor, Finlay House, McLeod Road, Karachi.

Iran

The British Embassy at Tehran has informed the Board of Trade that Abul Hassan and Seyed Mohamed Ali Mortazavi, Falakeh, Ahwaz, Iran, are interested in obtaining United Kingdom agencies for toasters, fans, deep-freeze units, refrigerators, irons and similar electrical domestic appliances. The Ahwaz company are considered to be a suitable connexion for United Kingdom firms. Manufacturers interested in this agency enquiry should write direct to the address given in paragraph one.

Cuba

Board of Trade circulars COM/13899 and COM/13899A, dated September 30, 1957 and October 25, 1957, respectively, gave information about two hotels, the "Santa Anna" and "Motel Bellavista" to be constructed in the province of Pinar del Rio, by the company Centro Turístico Montañas Occidentales, S.A. The B.O.T. has been informed that construction of the "Motel Bellavista" has been started but it may be some time before the company purchase equipment they will require. Señor García Navarro of the Cuban firm has given an assurance that offers already received from United Kingdom manufacturers will receive due consideration. The Cuban firm has now established its offices at Calle 23, No. 105, Vedado, and United Kingdom firms are advised to send future correspondence to that address.

The British Embassy have informed the B.O.T. that the firm of Fomento y Turismo de Cienfuegos, S.A., have been granted a customs franchise for marketing materials and apparatus required for the installation of a new motel in Cienfuegos, which is in a fairly advanced stage of construction. The list of likely requirements includes three kitchen refrigerators, 160 electric refrigerators, 200 individual air-conditioning units and four commercial air-conditioning units.

Canada

The 48th Provincial Exhibition will be held at Exhibition Park, Quebec City from September 4 to 13, 1959. The 1958 Exhibition attracted 211 exhibitors and over 400,000 visitors and the exhibits covered a wide range of consumer goods including foodstuffs, household appliances, radios, clothing, pottery, floor coverings, etc., some building products and a

considerable number of office machines and office equipment. The outdoor exhibits included farm equipment, municipal equipment, fire engines, scrapers, snow ploughs, shovels, etc., automobiles and bicycles. The exhibition park is readily accessible on the outskirts of Quebec City and serves an area in the heart of French Canada containing over 500,000 people who look to Quebec City for their needs.

Brazil

The Trade and Industry International Exhibition will be held in two sections, one for Brazilian industry and one an international section. The Brazilian industry section will be opened on January 31, 1959; the opening of the international section is not yet settled but will probably take place in March, 1959. United Kingdom firms who are interested in the Brazilian market and who wish their agents to participate are advised to keep in touch with them about the opening and closing dates of the exhibition. The organizers are:—Ministerio do Trabalho, Industria e Comercio, Palacio Trabalho, Avenida Presidente A Carlos 251, Rio de Janeiro D.F.

France

Société Georges Moreau & Cie., 10 rue Pergolèse, Paris, 16, have informed the British Embassy at Paris that they are interested in obtaining the representation of a United Kingdom manufacturer of refrigerated fruit drink dispensers. Société Georges Moreau & Cie, who were founded in 1933, deal in the import and export of foodstuffs for which they represent several United Kingdom principals. They are considered to be a suitable connexion for United Kingdom firms.

U.S.A.

The propeller division of the Curtiss-Wright Corporation has informed the British consulate-general, New York, that the division would like to get in touch with United Kingdom manufacturers with a view to manufacture under licence and market in the United States certain British products. "The division describes the products sought as follows:—The product or production line we seek should be a fairly complex, mechanical assembly. The inclusion of electric, electronic or hydraulic elements is satisfactory, but emphasis will be placed on products having a predominantly mechanical character with an intermediate quantity production potential. Neither the mass-produced articles associated with automotive or household appliances nor the 'custom' built job requiring one or two of a kind is desirable. Products should be of such a character that full scope of our background in engineering, manufacturing and sales can be used effectively. A product with some actual production and service experience is preferred, although we will consider items with little or no development background. Products of the following types may however interest the division:—Pumps and compressors; valves (hydraulic) and valve operating equipment; mechanical or hydraulic drives, and transmission systems generally (excluding automotive transmissions); actuation equipment or components therefor; conveyer equipment; constructional equipment, but not materials; food and chemical plant, etc." Manufacturers interested in this enquiry should write by air mail direct to:—Mr. B. W. Dudley, vice-president and general manager, Curtiss-Wright Corporation, Propeller Division, Caldwell, New Jersey, U.S.A.

Ceylon

Bonars (Ceylon) Ltd., P.O. Box 1311, 15 Morgan Road, Colombo, 2, have advised the United Kingdom trade commissioner at Colombo that they are anxious to represent as sole agents a United Kingdom manufacturer of air-conditioners of both window and console type. They are also interested in discussing with any likely principals the possibility of assembly of air-conditioners in Ceylon with a modified programme later of possible local manufacture of such parts as the steel casing. Bonars (Ceylon) Ltd., who were registered in 1951 as a limited liability company, are marine and general engineers, boat-builders, importers, and manufacturers' agents handling machinery and equipment, rolling stock and hardware. They have a staff of some 50 employees. The company have installed air-conditioning plants of various types in cinemas, theatres and hospitals. They are also servicing refrigeration and air-

conditioning equipment already installed in other parts of the island. The staff of their refrigeration department includes an experienced refrigeration engineer and numerous fully trained mechanics all under the supervision of an ex-sea-going chief refrigeration engineer. Bonars (Ceylon) Ltd., are considered to be a suitable connexion for United Kingdom firms. Manufacturers interested in this enquiry should write as soon as possible direct to Mr. H. Platt, general manager of the Colombo concern.

BOOKS RECEIVED

F.B.I. Register of British Manufacturers—1959. 31st edition. Published November 1958, for the Federation of British Industries by Kelly's Directories Limited and Iliffe & Sons Ltd. Publication price 42s., post free. Size 9½ in. by 7½ in. 1,140 pages. Bound full cloth.

The "F.B.I. Register," the comprehensive and accurate guide to a substantial cross section of British Industry, contains lists of the products and services of over 7,500 member firms under more than 5,400 alphabetical headings. In addition to the classified buyers' guide there are seven other sections in the register, giving addresses of companies and firms, and valuable information about trade associations, proprietary names, trade marks, etc. A feature providing a useful reference for buyers not fully conversant with British product terms, is the French, German and Spanish glossaries. These give translations of every product term used in the main buyers' guide, each being numbered for easy reference between the English headings and their translations.

Farmer and Stock-Breeder Year Book and Desk Diary 1959. Published by Farmer and Stock-Breeder Publications Ltd., Dorset House, Stamford Street, London, S.E.1, on November 25, 1958. Size 11½ in. by 8½ in. 350 pages. Price 15s. (including 2s. 9d. P.T.) Postage 1s. 9d. Laminated boards—quarter bound.

The "Farmer and Stock-Breeder Year Book" with its really useful desk diary, farm records section and accounts section will do much to help in the smooth day-to-day running of a farm. It offers the easiest way of keeping farm records. Superbly produced and fully indexed for quick and easy reference, the "Farmer and Stock-Breeder Year Book and Desk Diary 1959" gives a complete picture of the farming year. It will not only be invaluable during the year, but will be of interest and help in the years to follow.

"Refrigeration and Air-Conditioning" By W. F. STOECKER.—Assistant Professor of Mechanical Engineering, University of Illinois. Price 64s. inc. postage.

This book carries the analytical approach of refrigeration and air-conditioning another step forward. Emphasis is on the modern concept of the subject as a synthesis of the fundamentals of thermodynamics, heat transfer, and fluid mechanics. While the commercially important vapour-compression cycle is emphasized, special types of refrigeration systems are treated concisely.

Contents:—Applications of Refrigeration and Air-Conditioning — Methods of Refrigeration — The Vapour-compression Cycle — Multipressure Systems — Compressors — Water-Cooled and Air-Cooled Condensers — Expansion Devices — Evaporators — Refrigerants — The Complete Vapour-compression System — Absorption Refrigeration — Air-cycle Refrigeration — Steam-jet Refrigeration — Low-temperature Refrigeration — Heat Pumps — Psychrometry — Enthalpy Potential — Cooling Towers and Evaporative Condensers — Cooling and Dehumidifying Coils—Spray Equipment — Air-conditioning Calculations — Calculating the Cooling Load — Piping and Accessories.

"Principles and Practice of Flow Meter Engineering" by Lee K. Spink—8th edition—revised and enlarged—Pp. 550. Published by the Foxboro Company and obtainable from Foxboro-Yoxall Ltd., Redhill, Surrey at 108/-.

Earlier editions of "Principles and Practice of Flow Meter Engineering" have sold some 26,000 copies, so that most flow engineers will be familiar with the work. In this latest revised

and much enlarged 8th edition, the author, the late Lee K. Spink, (he died shortly after completing this edition), covers a much broader scope than previously. The book may be said to have reached the status of a text-book though it still retains its usefulness as a hand-book for everyday use by practising engineers particularly those in the oil, chemical and gas industries. The work is arranged in five parts and deals in great detail with every aspect of flow measurement.

The year 1958 was a momentous one for the International Institute of Refrigeration on account of the fiftieth anniversary of the First International Congress of Refrigeration which was marked by increasing its work sessions in 1958 with seven plenary sessions of commissions, two meetings of sub-commissions, six meetings of working parties. About 800 people took part in these meetings and nearly 200 papers were presented. This rhythm of work had never been reached before except at congresses.

THE ENTROPY CLUB

THE eighth annual general meeting of the Entropy Club took place at Beale's Restaurant, London, N.7, in the autumn.

At the "a. g. m." which was attended by 22 members, Mr. G. L. H. Bird was unanimously re-elected president, the new committee being Messrs. A. P. Arnold, B. C. Oliver, P. F. Stevens, Mr. T. Tiley, G. E. Virgo, W. J. Vandome and Mr. J. K. Hadley was re-elected hon. secretary and treasurer.

Two official guests were Mr. E. M. Heap of York Shipley Ltd. and Mr. D. T. Lec, secretary of the Institute of Refrigeration. There was a record attendance of 49 persons.

Mr. Heap, in proposing the toast of the club, said he would like to comment on administrative problems in their work, the importance of choosing the right man for the job, to find the best and not the hardest way of doing the work!; he gave witty examples. He said he joined his present firm as a draughtsman and he had never regretted his choice. Labour troubles, he said, were practically non-existent in the industry; it was rare for technologists to leave since they had pride in their work and had improved the lives of other people by the provision of improved food storage and hygiene and the use of air-conditioning in hot climates; further progress was however still possible. He went on to say he had seen the new colleges at Delft and Moscow and was very pleased that work on the new building of the National College had started. To ex-students of that College he was very pleased to propose the toast of "The Club."

Mr. C. V. Dellino suitably thanked Mr. Heap.

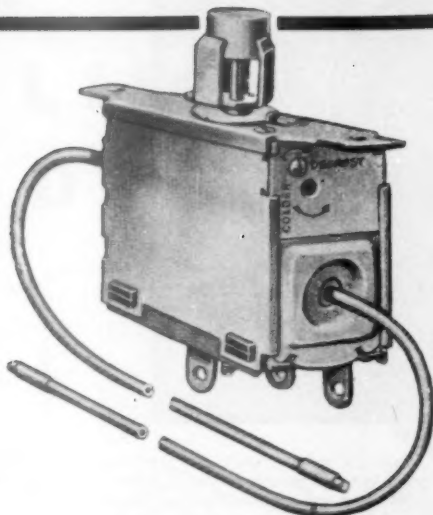
Mr. G. E. Virgo, in proposing the toast of the guests, said how pleased they were at seeing so many students from the National College who would be eligible to join the club on completion of their course. Their two principal guests were very well known. Mr. Heap was very eminent in the refrigeration industry and as a director of his firm he had greatly assisted the club which included many members and ex-members of his organization. Mr. D. T. Lec as secretary of the Institute of Refrigeration was very industrious and a great deal was owed to him for his tact and courage in dealing with his work. The club was very pleased that the guests had been able to attend.

Mr. D. T. Lee in reply said that secretaries were not expected to make long speeches but rather to listen. He was very pleased to meet old friends of the National College and then referred to its earlier days. He said he had asked many eminent colleagues to define "entropy" and had received as many answers! Mr. Lee then spoke about the Institute of Refrigeration and hoped he was not speaking to many non-members.

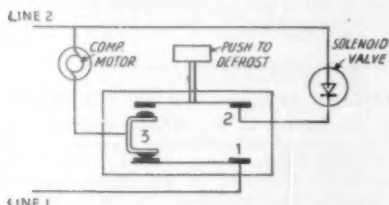
Mr. H. Sleight in proposing the toast of the president told the new students and members how he and his colleagues had "suffered" under Mr. Bird at the National College and outlined what they had missed by the president's method of lecturing! His wisdom and advice at committee meetings was very valuable to the club.

Mr. G. L. H. Bird in his reply remarked that tradition was

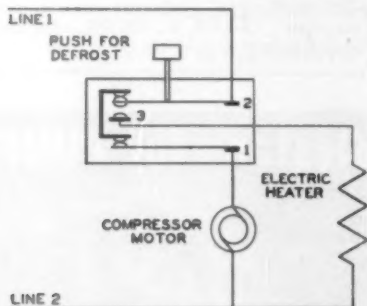
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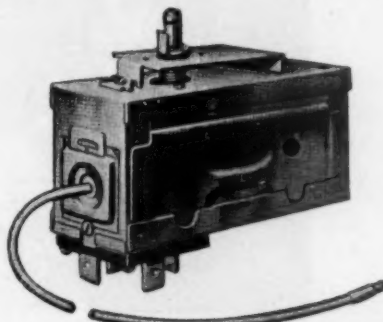
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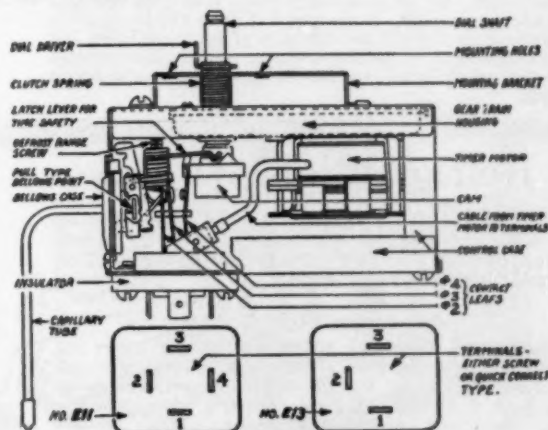
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valued in all societies, especially theirs. Traditions varied but the club had grown sufficiently to develop its own. Firstly, the dinner was a very happy function; venues had changed since the first reunion and the inviting of official guests was to be welcomed. He felt the inclusion of the toast to the president was another tradition. It was typical of the British to appoint a figure-head who represented the spirit of the organization and he was confident of the club's future. He thanked the club officers for their services and then he proposed a toast to absent friends.

After dinner the members spent a very congenial evening sitting around in small groups renewing old acquaintances and discussing old times and subsequent experiences.

The Entropy Club is formed from ex-students of Refrigeration at either the National College or Borough Polytechnic. Anyone who has completed a course of refrigeration at either of these two institutions and wishes to join the club is asked to contact the hon. secretary and treasurer, Mr. J. K. Hadley, 116, Elizabeth Avenue, Little Chalfont, Bucks.

Refrigeration Patents

These new refrigerating patents have been specially selected for readers by MODERN REFRIGERATION from the Official *Journal of Patents*, and are published by permission of the Controller of H.M. Stationery Office.

APPLICATIONS RECEIVED

November 7—Whitmore, N. C., P35790, Air cooler etc. 8—Whitmore, N. C., P35933, Air circulation cold store etc. 10—Little, Inc., A.D., C35995, Refrigeration apparatus etc. 11—Anoff, S. M., C36013, Food preserving cabinet construction. 12—United Aircraft Corporation, C36317, Air-conditioning systems. 14—Stratford Engineering Corporation, Putney, D. H., C36727, Effluent refrigeration. 19—Simmons, W. H., P37161, Refrigerators etc.; General Motors Corporation, C37205, Refrigerator cabinet; Monsanto Chemicals Ltd., Barrett, J. W., P37298, Insulating Materials. 20—General Electric Co. Ltd., Goldsmid, H. J., P37385, P37386 Refrigerators; MacDowell, C. F., P37432, Footwear air-conditioner. 21—General Electric Co., C37552, Refrigerating system etc. 24—British Oxygen Research & Development Ltd., Molnar, W., P37724, Thermal insulation. 25—Inland Steel Co., C37927, Temperature measuring system, General Electric Co. Ltd., Bury, H., P37931, Refrigerating Systems; General Electric Co. Ltd., Smith, R., P37932, Refrigerators; Waldy (London) Ltd., and Zaleman L. J., P37928, Electric refrigerators defrosting control. 28—British Refrasil Co. Ltd., Armstrong E., P38462, Thermal insulation. December 1—British Celanese Ltd., Beesley, S., P38612, Insulating Material; Hall, Ltd., J. & E., Bomford Ltd., and J. F. Stokes, Ltd., J. M. Allen B. P38794, Cooling apparatus.

COMPLETE SPECIFICATIONS ACCEPTED

November 26—Tucker, F. N., 807,612, Apparatus for the treatment of air inside an enclosed space; Carrier Engineering Co. Ltd., 807,596, Refrigeration systems; Heron, A. G., 807,812, Automatic defrosting of refrigeration apparatus; Locator, S.A., 807,597, Installation for the making of ice-creams; Carrier Engineering Co. Ltd., 807,706, Refrigeration systems; December 3—Armstrong Cork Co., 808,127, Method of protecting thermal insulation; Carroll, R. L., 808,054, Heat pump. 10—Licentia Patent-Verwaltungs-G.m.b.H., 808,378, Oil pumps for a motor-compressor unit of compression refrigerating machines; Gaudry, R., 808,589, Apparatus for emitting a directed stream of cold air.

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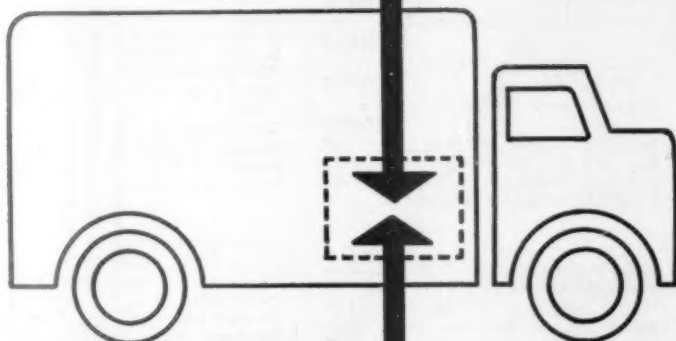
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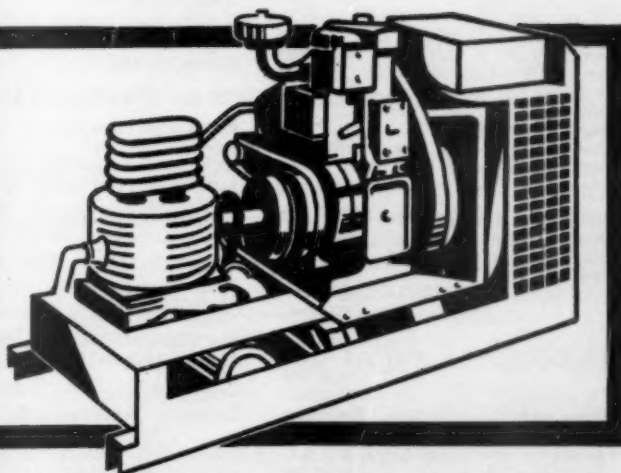


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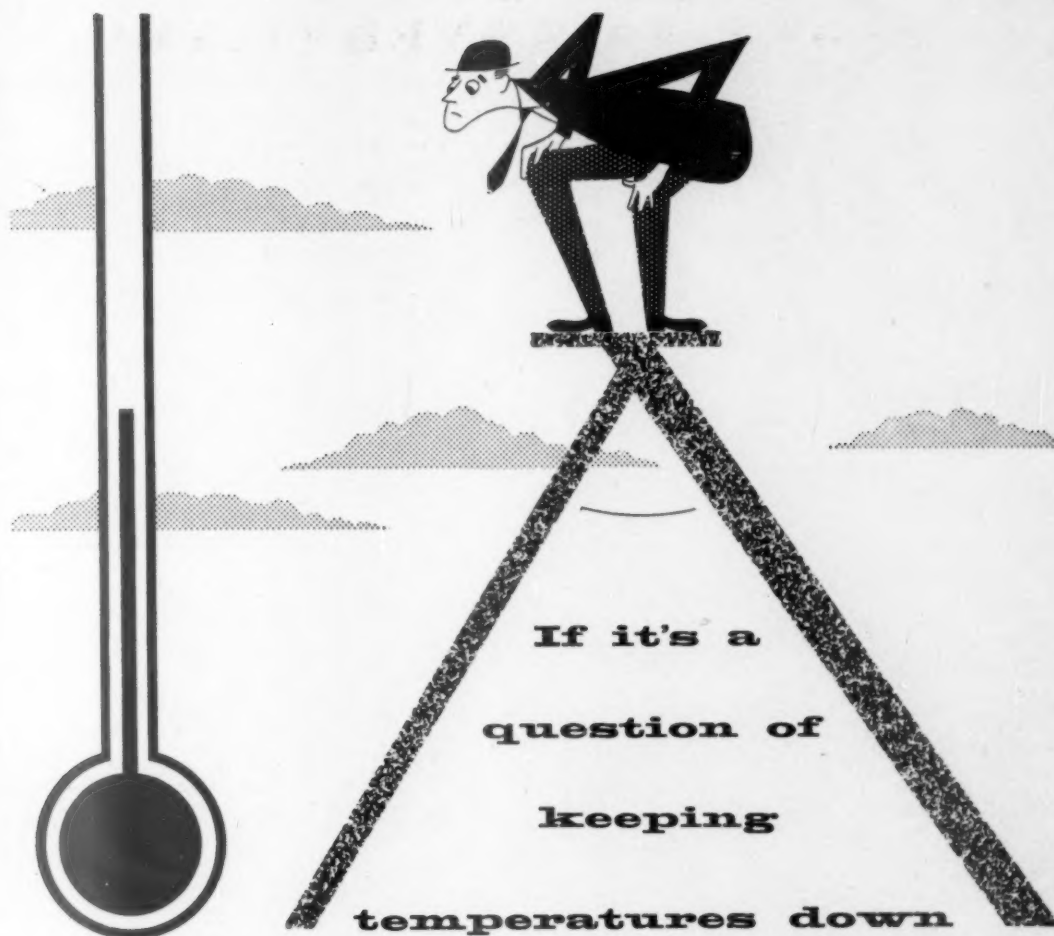
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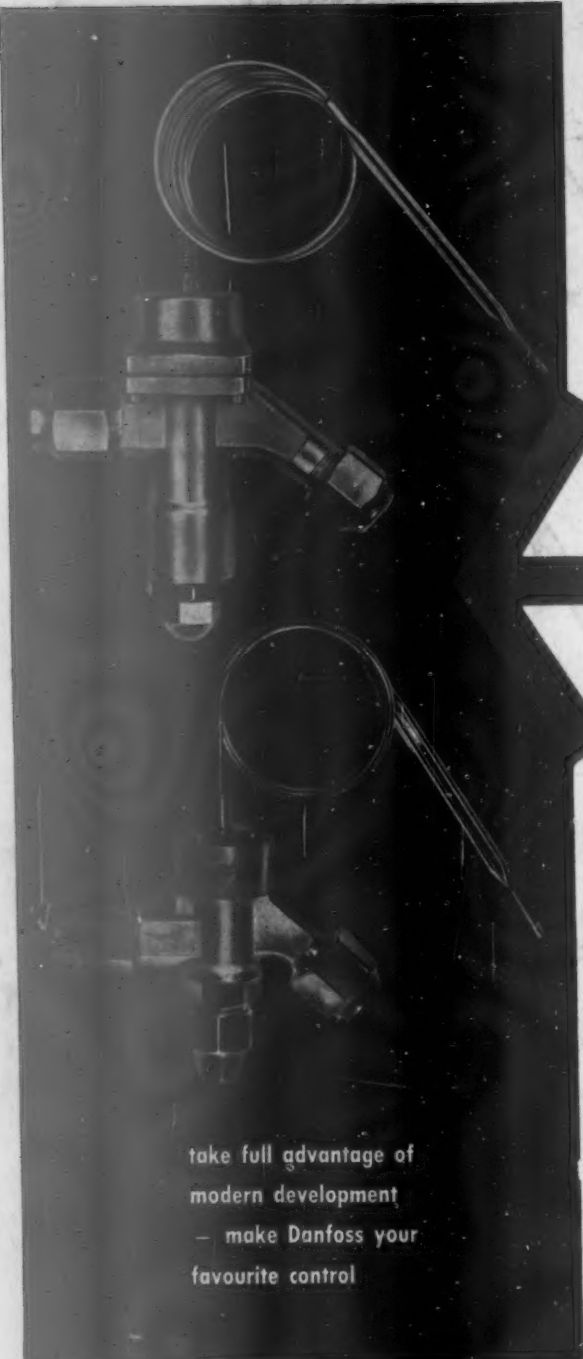
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